THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXXV. No. 873.] LONDON, FEBRUARY 3, 1880. [32ND YEAR.] Price 6d.

GAS PURIFICATION
BY
OXIDE OF IRON.

COOKE BROS.,
CENTRAL DEPÔTS:
CO. DONEGAL, IRELAND;
LONDON DEPÔT:
BLACKWALL, E.;
OFFICES:
26, 27, & 28, FENCHURCH ST.,
LONDON, E.C.

GENUINE TORBAY PAINT
And SPECIAL GASOMETER PAINT.
SEVERAL PRIZE MEDALS. ESTABLISHED OVER 20 YEARS.
These Paints are now used in over 200 Country Gas-Works, and by all the London Gas Companies, on Gas-holders, Scrubbers, Purifiers, &c. Also used by the Admiralty, War Office, Railway Companies, Founders, &c. They prevent and arrest rust, and protect iron from the action of water, sulphurous and gaseous exhalations; do not crack, blister, or flake off; will cover tar effectually.
The covering powers are considerably greater than those of any other Paint.—*See "Engineer," Nov.* 2, 1866.
Supplied, mixed ready for use, or in paste, as desired.
TORBAY PAINT COMPANY.
PROPRIETORS: STEVENS & CO.,
21, GREAT WINCHESTER STREET, LONDON.
WORKS: BRIXHAM, TORBAY.

THOMAS PROUD,
BROOKFIELD GAS APPARATUS WORKS,
103, ICKNIELD STREET EAST, BIRMINGHAM.
CONTRACTOR FOR
LAYING MAINS
FOR
Gas, Water, & Sanitary Purposes,
AND MANUFACTURER OF
WOOD GRIDS
FOR
SCRUBBERS AND PURIFIERS.

COWEN'S PATENT FIRE-CLAY RETORTS.
JOSEPH COWEN and CO.,
BLAYDON BURN, BLAYDON-ON-TYNE,
Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS-RETORTS and other OBJECTS in FIRE-CLAY," and they were also awarded at the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for "GAS-RETORTS, FIRE-BRICKS, &c., for EXCELLENCE of QUALITY."
J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpieces, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.
COWEN'S GARESFIELD COALS.
JOS. COWEN & CO. are the only Manufacturers of FIRE-BRICKS and CLAY RETORTS at BLAYDON BURN.

JOHN RUSSELL & CO.,
LIMITED,
Established at the commencement of Gas Lighting,
MANUFACTURERS OF
TUBES AND FITTINGS.
THREE PRIZE MEDALS,
Paris, 1878.
HEAD LONDON OFFICE:
145, QUEEN VICTORIA STREET.
ALMA TUBE-WORKS, WALSALL;
OLD PATENT TUBE-WORKS, WEDNESBURY.

JOHN BENT & SON,
BELL BARN ROAD, BIRMINGHAM,
MANUFACTURERS OF
WET AND DRY GAS-METERS,
LICENSEES AND MANUFACTURERS OF
HUNT'S
PATENT COMPENSATING METERS
STREET-LAMPS, &c., &c.
ESTABLISHED 1830.

THOMAS PIGGOTT & CO.,
SPRING HILL, BIRMINGHAM,
MANUFACTURERS OF
TELESCOPIC & SINGLE GASHOLDERS,
CAST & WROUGHT IRON TANKS FOR DITTO,
And Gas Apparatus of every Description.
Marine, Tubular, Cornish, Plain, Furnace, Saddle and Range Boilers.
SUGAR, SALTPETRE, AND ALL KINDS OF PANS.
Roofs, Girders, and Bridges, and General Smith's Work.
London Offices: 97, CANNON STREET—
JAMES E. & SAMUEL SPENCER, Agents.

THE
"OTTO" GAS-ENGINE.
See Page 158.
CROSSLEY BROTHERS,
MANCHESTER AND LONDON.

THE
DUKE OF HAMILTON'S
LESMAHAGOW
CANNEL COAL.
AGENT:
JAMES M'KELVIE,
HAYMARKET,
EDINBURGH.
ESTABLISHED 1840.

CHANGE OF ADDRESS.
GEORGE GLOVER AND CO.,
DRY GAS-METER MANUFACTURERS,
HAVE REMOVED TO MORE EXTENSIVE PREMISES:

RANELAGH WORKS, ROYAL AVENUE, CHELSEA, LONDON, S.W.

WELLINGTON TUBE WORKS,

GREAT BRIDGE, TIPTON, STAFFORDSHIRE.

JOSEPH AIRD,

GAS, STEAM, AND HYDRAULIC TUBES AND FITTINGS.

G. J. EVESON

Has on Sale a large quantity of Cannel, South Yorkshire, Wigan, and Ruabon Coal, purchased previous to the late advances.

Prices on Application.

GAS COAL AND CANNEL CONTRACTOR, BIRMINGHAM.

ROBT. DEMPSTER & SONS,

GAS ENGINEERS, IRONFOUNDERS, AND CONTRACTORS,

ROSE MOUNT IRON-WORKS, ELLAND, YORKSHIRE.

MANUFACTURERS OF EVERY DESCRIPTION OF

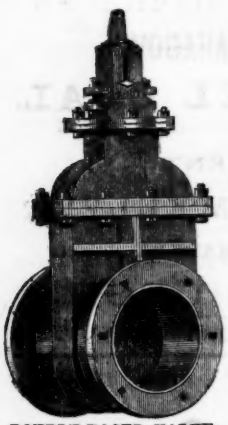
GAS APPARATUS;

CONTRACTORS FOR THE

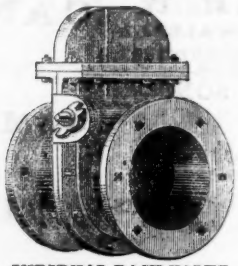
ERECTION OF PUBLIC AND PRIVATE GAS-WORKS.

Plans and Specifications Prepared, and Illustrated Catalogues forwarded on application.

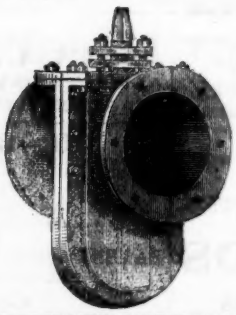
C. & W. WALKERS' GAS-VALVES.



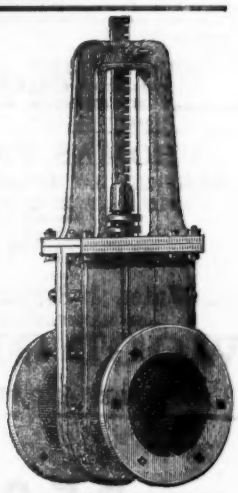
DOUBLE-FACED VALVE SPECIALLY FOR PURIFIERS.



INTERNAL RACK-VALVE WITH STEEL PINION, FOR GENERAL USE.



UNDERGROUND SCREW-VALVE FOR SHALLOW STREET-MAINS.



ORDINARY RACK AND PINION VALVE.

MIDLAND IRON-WORKS,

DONNINGTON, near NEWPORT, SHROPSHIRE; 8, FINSBURY CIRCUS, LONDON.

TRADE MARK.

THE MEDAL FOR 1862.

The only Prize Medal awarded for TUBES & FITTINGS.

CROWN TUBE-WORKS,

WEDNESBURY, STAFFORDSHIRE.

WAREHOUSE: SOUTHWARK STREET, LONDON.

JAMES RUSSELL & SONS, LIMITED,

PATENTEES & FIRST MAKERS OF WROUGHT-IRON TUBES,

ONLY MAKERS OF HOMOGENEOUS METAL TUBES.

MANUFACTURERS OF

TUBES and FITTINGS for GAS, STEAM, and WATER;

LAP-WELDED, LOCOMOTIVE, MARINE, and other BOILER TUBES;

HYDRAULIC TUBES, BEDSTEAD TUBES, WELL TUBES, TELEGRAPH POSTS, COILS, &c.,

GAS-FITTERS TOOLS, VALVES, COCKS, &c.

THOMAS PIGGOTT & CO.,

(Established 1822,)

SPRING HILL, BIRMINGHAM.

MANUFACTURERS OF

TELESCOPIC & SINGLE GASHOLDERS,

CAST & WROUGHT IRON TANKS FOR DITTO;

PURIFIERS, CONDENSERS, SCRUBBERS, RETORTS, VALVES;

IMPROVED WROUGHT-IRON RETORT-LIDS, CROSS-BARS, & SCREWS;

AND GAS APPARATUS OF EVERY DESCRIPTION.

SOLE MANUFACTURERS OF LIVESEY'S PATENT GASHOLDER MAN-LID,

By use of which Man-lid, inlet and outlet pipes can be examined and cleansed without loss of gas in crown of holder, or ingress of atmospheric air.

ROOFS, GIRDERS, BRIDGES, AND BOILERS OF ALL KINDS.

Drawings, Specifications, and Estimates supplied on application.

LONDON OFFICES: 97, CANNON STREET—JAMES E. & SAMUEL SPENCER, AGENTS.

EDWARD E. CROMBIE & CO.,

INVENTORS AND PATENTEES

OF THE

FRICTIONLESS DRY GAS-METERS,

Beg to intimate to Gas Companies and others that they are now prepared to supply these very superior Meters at the same prices as for the ordinary Gas-Meters.

In the construction of this Meter, for which the best tin plates only are used, every mechanical contrivance has been taken advantage of successfully to reduce the friction to a minimum, which is amply proved by the fact that they are made to work upon only one-fortieth of an inch pressure. By an improvement also in their construction, a steadier light is obtained, and greater capacity than can be got from any other Meter in the market. No gas can pass under the valves on any back pressure, as is the case with many other Dry Meters.

To Gas Companies supplying gas through streets with heavy gradients, these Meters are invaluable, as much gas is saved from the low pressure required to work them.

ALL METERS ARE UPHELD FOR FIVE YEARS.

METROPOLITAN WORKS, DIANA PLACE, EUSTON ROAD, LONDON, N.W.

SAMUEL CUTLER & SONS,

CONTRACTORS FOR GAS & WATER WORKS, GENERAL ENGINEERS, IRONFOUNDERS & MANUFACTURERS OF

GASHOLDERS, TANKS, PURIFIERS,

SCRUBBERS, VALVES, EXHAUSTERS, IRON ROOFS, BRIDGES, BOILERS, AND GENERAL CAST AND WROUGHT IRON WORKS.

S. C. & SONS undertake the entire erection of New, or Remodelling of existing Gas-Works in any part of the World, including small Works for MANSIONS, FACTORIES, &c., or Works of the largest extent (are now constructing the largest Gasholder yet erected); also the supplying and laying of MAINS.

They make a speciality of supplying every requisite whatever for Gas-Works, keeping in Stock what are most in request. WOOD SIEVES for Purifiers and Scrubbers, of a superior make.

SPECIAL CASTINGS to Drawing or Pattern at Shortest Notice.

Manufacturers of MORRIS & CUTLER'S PATENT CONDENSER & CUTLER'S PATENT GAS-WASHER.

DESCRIPTION OF MORRIS & CUTLER'S PATENT CONDENSER.—The Condenser may consist of pipes arranged in tiers, or in any other form most convenient to the site available, each tier being connected with special connections, and containing within same either one or more coils of smaller pipe through which water is passed, being supplied from any convenient source of supply, the water passing in an opposite direction to the gas, so that the coldest water is at the gas outlet. The power of the Condenser can be regulated precisely in proportion to the quantity of water allowed to pass through, which is not in any way contaminated, but simply heated by the hot gas, and advantage can be taken of its being at a high level to carry it to a high-level cistern, from whence it can be used for supply to boiler or any other purpose. The Condenser itself may form the support for a high-level cistern. By an arrangement of valves the water may be shut off, and an air orifice opened, when air will pass through instead of water, or both air and water can be shut off. The power of the Condenser is, therefore, entirely under control. The Condenser may be seen in operation at the Brentford Gas-Works.

For further Particulars, apply to Mr. P. MORRIS, GAS-WORKS, BRENTFORD, or to S. CUTLER & SONS, PROVIDENCE WORKS, MILLWALL (Near the Steamboat Pier), LONDON, E.

DANIEL HOWARD,

(Successor to the late BENJ. WHITEHOUSE),

GASHOLDER AND BOILER WORKS,

WEST BROMWICH, NEAR BIRMINGHAM (Established 1765),

MANUFACTURER OF

TELESCOPIC AND SINGLE GASHOLDERS,

WROUGHT AND CAST-IRON TANKS FOR DITTO.

PURIFIERS, CONDENSERS, SCRUBBERS, HYDRAULIC MAINS, AND ALL KINDS OF GAS APPARATUS.

WROUGHT-IRON ROOFS, BRIDGES, GIRDERS, ETC.

STEAM, HOT WATER, AND RANGE BOILERS, TANKS, CISTERNS, BOATS,

AND ALL KINDS OF WROUGHT-IRON WORK.

Drawings, Specifications, and Estimates supplied on application.

GAS PURIFICATION

BY

OXIDE OF IRON.

GAS PURIFICATION & CHEMICAL Co., LIMITED,

PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.

JOHN WM. O'NEILL, Managing Director.

GAS *v.* ELECTRIC LIGHT.

WIGHAM'S PATENT LIGHTHOUSE GAS-BURNERS,

For Street Lighting and the Illumination of Large Halls, Factories, Ship Yards, &c., where Powerful Light is required.

These Burners have been adopted by a School Board, having large school-rooms in charge, because of their high illuminating power and the facilities they give for perfect ventilation. The actinic power of these Burners is such that they are used successfully for Photography and Photo-Lithography.

SOLE MANUFACTURERS:

J. EDMUNDSON & CO., Gas Engineers, 19, GREAT GEORGE STREET, WESTMINSTER, LONDON, S.W.

ALDER AND MACKAY,

MANUFACTURERS OF

IMPROVED WET AND DRY GAS-METERS

IN CAST-IRON AND TIN CASES OF THE HIGHEST EXCELLENCE.

Original Manufacturers of Dry Meters in Cast-Iron Cases.

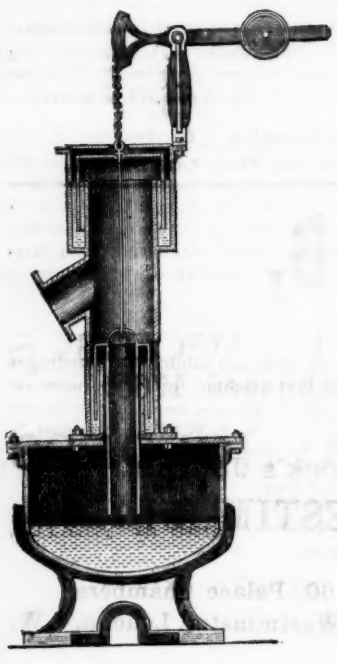
STATION-METERS, EXPERIMENTAL-METERS, PHOTOMETERS, & PRESSURE-GAUGES, &c.

GRANGE WORKS, EDINBURGH.

SELF-ACTING REMOVABLE DIP-PIPE,

PATENTED BY

CHANDLER & STEVENSON.



The following Testimonials, as to five years constant working of this Patent Removable Dip, have been received:—

Metropolitan District Asylum Gas-Works, Caterham, Surrey, Jan. 15, 1874.

Messrs. CHANDLER and SONS.

DEAR SIRS,

In reply to your inquiries, I beg to inform you that since I have used your Patented Dips (ten in number), I find my make has increased over 1000 cubic feet per ton of coal carbonized, my usual make being 9070 cubic feet before using your Dips, and 10,150 cubic feet since using them.

Metropolitan District Asylum Gas-Works, Caterham, Surrey, Dec. 30, 1879.

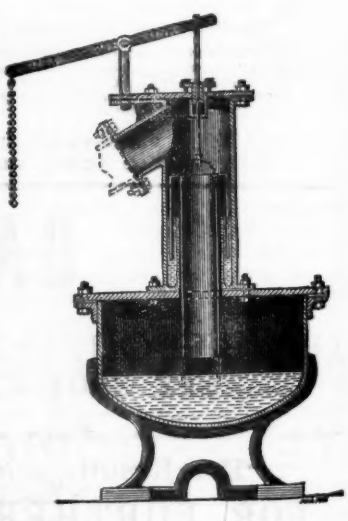
Messrs. CHANDLER and SONS.

DEAR SIRS,

In reply to your inquiry, it is with very much pleasure that I endorse every word of my letter of Jan. 15, 1874; and I may add that from the date the Patent Dips were fitted, they have worked perfectly, and there is very little carbon deposited in the retorts, in consequence of the lower pressure.

Yours faithfully,

(Signed) W. CRICKMAY,
Memb. Soc. Engineers.



APPLICATIONS TO BE MADE TO

Messrs. CHANDLER & SONS,

104, NEWINGTON CAUSEWAY, S.E.

KIRKHAM, HULETT, & CHANDLER, LIMITED.

PATENT "STANDARD" WASHER-SCRUBBER, FOR GAS PURIFICATION,

TAKES OUT EVERY TRACE OF AMMONIA AND A LARGE QUANTITY OF CARBONIC ACID AND SULPHURETTED HYDROGEN BY ONCE PASSING THROUGH THE MACHINE.

AMMONIACAL LIQUOR OBTAINED OF ANY REQUIRED STRENGTH.

The Cost of the Machine defrayed by the Ammonia obtained in Twelve Months.

It requires very little attention, and cannot get out of order.

THESE MACHINES HAVE BEEN SUPPLIED TO THE FOLLOWING GAS-WORKS:—

	Feet per Day.
The Gaslight Company, London—	
Beckton	5,000,000
Bromley	7,000,000
St. Pancras	3,000,000
Bradford Corporation	1,000,000
Bremen	150,000
Buxton Local Board	250,000
Dukinfield Local Board	500,000
Driffield Company	100,000
Goole Company	250,000
Glossop Company	300,000
Holywood Company	125,000
Heywood Local Board	600,000
Leeds Corporation	2,000,000
Leominster Company	150,000
Maidstone Company	1,000,000
Phœnix Company, Greenwich	2,500,000
" " Vauxhall	3,000,000
Woolwich Equitable Company	400,000
Yeadon Company	500,000

AND MANY OTHERS ARE IN COURSE OF CONSTRUCTION.

TESTIMONIALS.

Messrs. KIRKHAM, HULETT, and CHANDLER. *Engine-Works, Millbank, Westminster, S.W., March 5, 1879.*

Gentlemen,—In accordance with your instructions, I have taken diagrams from Vertical Engine driving your Patent Horizontal Washer-Scrubber to purify 60,000 feet of gas per hour on the works of The Gaslight Company at King's Cross, and find the following results, viz.:—

Horse power required to drive engine, shafting, and gearing alone	= 0·398
Total horse power with washer on	= 1·721
Absolute horse power required to drive Washer-Scrubber	= 1·323

(Signed) THOS. HORN.

Messrs. KIRKHAM and HERSEY. *The Gaslight and Coke Company, Bromley-by-Bow, E., June 2, 1879.*

Gentlemen,—I have much pleasure in stating that the results of the working of Kirkham, Hulett, and Chandler's Washer-Scrubber, erected at these works in 1877, have been perfectly satisfactory, and that the two erected last year are doing well—all that you guaranteed; indeed, the effectiveness of the machine is so convincing, that I am induced to recommend another being ordered if you can undertake to have it erected complete before next winter. (Signed) W. B. WRIGHT, Engineer.

Messrs. KIRKHAM and HERSEY. *Phœnix Gaslight and Coke Company, Office, Greenwich, S.E., Aug. 12, 1879.*

Gentlemen,—In reply to your inquiry, one of your Patent Scrubber-Washers to purify 100,000 cubic feet per hour was put into operation at these works on the 1st of June. At the same moment the whole of our Scrubbers, equal to 28,000 cubic feet, were thrown out of use, leaving your Washer the whole work of freeing the gas from Ammonia. This it has done to perfection up to date. With 10 gallons of water to each ton of coal carbonized passing through it we get a clean test at the seventh chamber, leaving four chambers margin for extra work. The mean quantity of Ammonia in the inlet (fixed and free) obtained from a large number of tests was 241 grains per 100 feet of gas. On the outlet—Free Ammonia—Nil. The quantity of water used is 10 gallons per ton of coal carbonized. The strength of liquor as follows:—

Chamber No.	1	2	3	4	5	6	7	8	9	10	11
Strength of liquor—ounces	Nil.	Nil.	Nil.	Nil.	0·4	1·0	2·2	3·5	5·5	8·25	12·5

We are working five revolutions per minute. It takes out all the free Ammonia, reduces the carbonic acid and sulphuretted hydrogen 30 per cent., requires a very small amount of power to drive, and altogether is, in my opinion, the best machine for the purpose yet invented, and will, I feel confident, ere long, entirely supersede the Scrubbers of to-day. I am glad to find you are going to fix one of these Washers at our Vauxhall works. (Signed) P. J. WATES, Engineer.

For Results and other Testimonials, see next week's Journal.

FOR FURTHER PARTICULARS AND TESTIMONIALS, ADDRESS MESSRS.

KIRKHAM, HULETT, & CHANDLER, LIMITED, { 59 & 60, Palace Chambers, Bridge St. Westminster, London, S.W.

AN ENGINE WHICH WORKS WITHOUT A BOILER OR STEAM

AVERAGE WEEKLY DELIVERY
(INCLUDING CONTINENTAL)
OVER TWENTY ENGINES.

The durability of these Engines is now established by experience, one of them having run night and day at the Hinckley Gas-Works for over Twelve months without any expenditure for repair; this being equal to about 2½ years average work.

Over 1900 already delivered.

Very numerous Testimonials from Users, including Engineers, Men of Science, and others, on application to the makers.

No trouble with Coal, Ashes, Smoke, Insurance, Water, or constant attendance.

No Glands to pack, or Water Gauges and Steam Gauges to watch.

STARTS AT A MOMENT'S NOTICE.

THE "OTTO" SILENT GAS-ENGINE.

(Otto and Crossley's Patents, 1876 and 1877,)

THEY ARE USED FOR ALL KINDS OF PURPOSES, CHIEFLY FOR EXHAUSTERS, SCRUBBERS, & PUMPS.

DELIVERED IN MANCHESTER. SIZES { NOMINAL HORSE POWER ½ 1 2 3½ 6 8 12 16 / MAXIMUM HORSE POWER ¾ 1½ 2½ 4 9 12 18 24 } OFFERED. CASES NOT CHARGED IF RETURNED FREE.

PRICES INCLUDE CAST-IRON STAND, TURNED FLY-WHEEL, AND DRIVING PULLEY; WATER-VESSEL, SEVERAL DUPLICATES, AND GAS-FITTINGS (EXCEPTING METER AND PIPES).

WORKS AND HEAD OFFICES: Gt. Marlbro' St., Gloster St.

CROSSLEY BROTHERS, MANCHESTER.

LONDON HOUSE: 116, Queen Victoria St., E.C.

THE NEW GAS COOKER.

40 PER CENT. OF GAS SAVED.

No. A510 same as our **No. A152,**
But Lined with Patent Non-Conductor.
Will Roast, Bake, and Fry, and with Three Burners for Boiling.

SIZE.
Outside—30in. high, 20in. wide, 20in. deep.
Inside—19½in. „ 14in. „ 17in. „
Price . . . . . **£4 14s. 6d.**

No. A500.
Lined with Patent Non-Conductor.
Is fitted with Roasting and Baking Oven and Four Burners for Boiling.

SIZE.
Outside—34in high, 20in. wide, 19in. deep.
Inside—30in. „ 16in. „ 17in. „
Hot Plate—24in. by 23in.
Price . . . . . **£7 10s. 0d.**

No. A505.
Same as with Roasting and Baking Oven, a Broiler or Toaster, a Chop Griller, a Hot Water Boiler, and Three Burners for Boiling.
Hot Plate—26in. by 24in.
Price . . . . . **£9 15s. 0d.**

These Cookers are jacketed, on the sides, top, and door, with a new and very efficient non-conducting material, by the use of which a **saving** of gas to the extent of **40 per cent.** is effected.

Gas Companies who are selling or hiring stoves should see these stoves. Catalogues and particulars on application to

JOHN WRIGHT & CO., ESSEX WORKS, BROAD STREET, BIRMINGHAM.

London Warehouses: { 155a, Upper Thames Street, / 1, Little Bush Lane.

TANGYE BROTHERS AND HOLMAN,

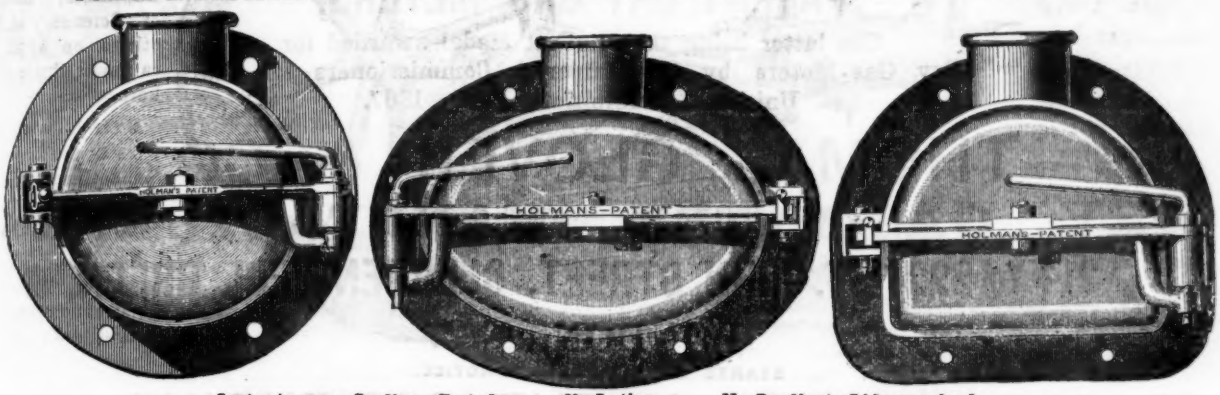
CORNWALL HOUSE, 35, QUEEN VICTORIA STREET, LONDON, E.C.,

(LATE OF 10, LAURENCE POUNTNEY LANE.)

SOLE MAKERS OF MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH HOLMAN'S PATENT ECCENTRIC FASTENINGS,

Anti-Friction Catches, and New Self-Adjusting Cross-Bars.



Instantaneous Sealing effected. No Luting. No Duplicate Lids required.
Holman's New Self-Sustaining Cross-Bar ensures freedom of Joint, and maintains parallel position of the Lids.

Since their introduction in 1869, these Patent Retort-Lids have been thoroughly tested, being now in use in nearly all the principal Gas-Works in London and the Provinces.

T. B. and H. are now making the "Morton's Self-Sealing Lid" of the SAME FORM OR SECTION AS THE RETORT (see Illustrations above), as well as bringing the Mouthpiece from the D or Oval at back to Circular in front, as heretofore.

D and Oval Mortons Lids are working satisfactorily both in this country, on the Continent, and in the United States of America. Among others they have been adopted by the following Gas-Works:—

The Gaslight Company's Works, Fulham; Ditto, Bromley-by-Bow; Ditto, King's Cross; Ditto, Shoreditch.
And also in the Gas-Works at Richmond, Maidstone, Gloucester, Glasgow, Portsea, Roubaix (France), The Hague (Holland)

HUNT'S PATENT EQUILIBRIUM GAS-GOVERNOR.

In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown in the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

The principal advantages of this arrangement over the ordinary form of Governor are as follows:—

Its sensitive action prevents oscillation.

It is self-adjusting—*i.e.*, it maintains a steady pressure under variations of inlet pressure or a fluctuating consumption.

The inlet to Gasholder being contracted to the smallest possible dimensions, all danger from leakage through insufficiency of seal, tilting, &c., is entirely avoided.

The valve portion being separate from the holder, it can be handled and fixed like an ordinary Slide-Valve direct in the main; and the holder can be placed at an convenient distance immediately above it. The cost is thus materially reduced, and the inconvenience of heavy lifts done away with.

There are no working parts likely to get out of order.

These Governors have been adopted by many leading Gas Companies, among whom are the following:—

The Gaslight and Coke Co. (9), The London Gas Co. (3), and at Abergavenny, Arundel, Birmingham, Cannes (France), Devonport, Dursley, Exeter, Guernsey, Halesowen, Mentone (France), Monmouth, Newcastle-on-Tyne, Oxford, Plymouth, Rochdale, Windsor, &c.

TESTIMONIAL.

The Gaslight and Coke Company,
9, Water Street, New Bridge Street,
Blackfriars, E.C., Feb. 27, 1875.

MESSRS. TANGYE BROTHERS AND HOLMAN.

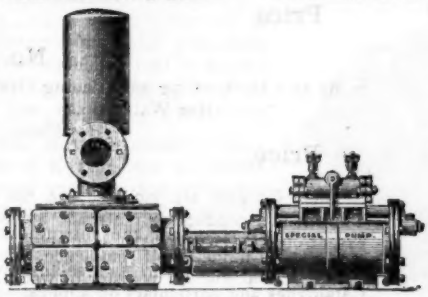
Gentlemen,—The two 24-inch and three 36-inch Hurt's Equilibrium Governors supplied by you, and fixed in the valve-rooms at Whitechapel, Goswell Road, and Blackfriars, are working very satisfactorily.

Yours truly,
(Signed) JOHN JOHNSON.

PRICES AND FULL PARTICULARS ON APPLICATION.

THE "SPECIAL" STEAM-PUMP.

Diameter of Steam Cylinder.	Diameter of Water Cylinder.	Length of Stroke.	Gallons of Water per Hour, Approximate.	Reduced Prices.
3	1½	9	450	£16
4	2	9	815	18
5*	2½	12	1,250*	21
5*	3	12	1,830*	22 10
4	4	12	3,250	25
6*	4	12	3,250*	30
5	5	12	5,070	32 10
7*	5	12	5,070*	40
6	6	12	7,330	40
8*	6	12	7,350*	50
7	7	12	9,750	50
10*	7	12	9,750*	65



In use in a Hundred Gas-Works in the United Kingdom for Pumping Ammoniacal Liquor, Water, or Tar.

Messrs. Burt, Boulton, and Haywood, Manufacturing Chemists, have over FORTY "Special" Steam-Pumps in use at their several large Tar-Works.

Two Hundred Sizes made. Those in Table opposite are the leading Sizes for use in Gas-Works and Chemical Works.

* These Sizes being usually selected for pumping Tar and Liquor, are always in stock, or nearly ready, fitted with all pump details in iron, and extra length distance-piece between steam and pump cylinder, at a small extra cost.

TANGYE'S HIGH-PRESSURE AND CONDENSING STEAM-ENGINES; CORNISH, VERTICAL, & TUBULAR BOILERS; HYDRAULIC AND SCREW LIFTING-JACKS, CRABS, PULLEY-BLOCKS, &c.

FULL PARTICULARS, ESTIMATES, CATALOGUES, ETC., ON APPLICATION.

London, 1851. New York. 1853. Paris, 1855. London, 1862.

Dublin, 1865. Paris, 1867.

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters bv the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

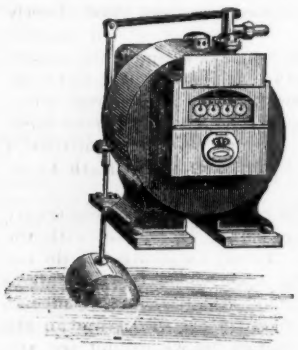
LONDON, E.C.

THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS.

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON AND CO.

(ESTABLISHED 1816.)



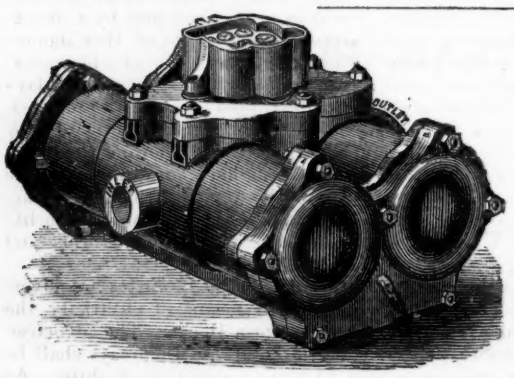
SOLE MAKERS OF THE LOW-PRESSURE WATER-METER.

This Meter will register with perfect accuracy, either at full speed, or with a few drops only passing through it.

It must be placed over the cistern to be supplied, and the water, after being measured, will fall from the outlet into the cistern below.

Each Meter is fitted with a ball-valve, so made that it can be adjusted to shut off the supply at the inlet when the water reaches any required height in the cistern.

The 100-gallon Meter is fitted with a cistern holding about three or four gallons, and may be fixed inside a house, free from the effects of frost, and requires no attention after once being fixed.



HIGH-PRESSURE WATER-METER.

The Union Water-Meter, of which an external view is here given, is of the positive class—*i.e.*, a Meter in which a measuring chamber is alternately filled and emptied, each filling being duly recorded. It is formed of two cylinders, with double pistons in each, having a rotary-valve of peculiar construction, which is worked from cams on the piston-rods.

It is claimed for this Meter, among its advantages over other Piston Meters in use, that it is extremely small and compact, and that its durability and accuracy have been proved by the fact that upwards of 20,000 of them, of various sizes, are in successful operation in the States. In England the instrument has been fully tested by several Water Engineers of eminence, and pronounced by them as a reliable and satisfactory register of water supply; it is also economical in cost.

ALL METERS are TESTED with 60 lbs. pressure before they are sent out.

COTTAGE LANE, CITY ROAD, LONDON, E.C.

CONTENTS.

	PAGE
Circular to Gas Companies:—	
The Dangers of the Electric Light	161
The St. Katherine's Docks Company and the Electric Light	161
Street Lighting in Foggy Weather	162
The Edison Electric Light	163
Gas Lighted Buoys	162
Destruction of Lead Gas Piping by Rats	162
Gas Affairs at Reading	162
The Annual Statistical Report of the West of Scotland Association of Gas Managers	162
Leading Articles:—	
Provisional Orders for 1880	162
Urban Water Supply	163
The Outfall Sewers on the Thames	164
Correspondence:—	
The Hydraulic Main	165
Frozen Lamp Services	165
Gas Companies Accounts	166
Parliamentary Intelligence:—	
Gas and Water Bills, 1880	166
Legal Intelligence:—	
High Court of Justice of Ireland—Exchequer Division—Corporation of Kilkenny *v.* Kilkenny Gas Company	166
Stafford-shire Assizes—Hipkins *v.* Corporation of Birmingham	167
Yorkshire Winter Assizes—West Riding Division—The Recent Explosion at the Bradford Corporation Gas-Works	167
Liskeard County Court—The Supply of Water to Liskeard Workhouse	168
Worship Street Police Court—The East London Water-Works Company again Convicted	168
Miscellaneous News:—	
Metropolis Gas Supply	168
Reduction in the Price of Gas at Matlock Bridge	168
Holmfirth Gas Company	168
Meeting of the Pará Gas Company	169
Dearne Valley Water Bill	170
Limerick Water Supply	170
Reading Gas Supply	170
Tisbury Gas Company, Limited	170
Midland Association of Gas Managers	171
Newport (Mon.) Gas-Works Benefit Society	171
Sale of Shares in the New River Company	172
Edison's Latest Device Reviewed by an Expert	172
Trade Reports	172
Worcester New Gaslight Company	173
The Gas Engineer's and Superintendent's Pocket Almanack	173
Grimsby Water Company	173
Map of the Metropolitan Water Companies Districts	173
The Supply of Water by Meter	173
The Gas Supply of Waterford	173
Worcester Town Council and the Liverpool Corporation Water Scheme	173
Whitworth Vale Gas Company	173
Manchester Corporation Gas-Works Loan	174
Carlisle Corporation Gas and Water Supply	174
Sewerage Difficulties in Wilts and Dorset	174
Serious Gas Explosion at Cardiff	174
Mr. W. H. Preece on Gas *v.* Electric Light	174
The Ashton, Stalybridge, and Dukinfield Water-Works Arbitration	174
Register of Patents:—	
Tasker, J. W.—Illuminating Apparatus	174
Siebert, O.—Gaslight Apparatus	175
Heritage, J.—Ball-Valves	175
Giroud, H.—Rheometric Gas-Burners	175
Groth, L. A.—Gas-Burners	175
Gedge, W. E.—Gaseliers	175
Molison, A. R.—Electrical Apparatus for Igniting Illuminating Gas	175
Parkinson, G. J.—Gas-Burner Regulators	175
Wallace, R. W.—Manufacture of Sulphate of Ammonia	175
Lake, W. R.—Manufacture of Gas	175
Cutler, S.—Manufacture of Gas	175
Carson, W.—Generation and Application of Illuminating Hydrocarbon Gases	175
Lake, W. R.—Gaslight Extinguishers	176
Weatherhogg, G. W.—Gas Motor Engines	176
Applications for Letters Patent	176
Patents which have passed the Great Seal	176
Share List of Gas and Water Companies	176

TO CORRESPONDENTS.

E. S.—*Certainly not.*

W. D.—*We do not understand your question as stated. Send further, more definite particulars.*

R. R.—*You can sell either by weight or measure; always supposing that the implements used are in accordance with the Weights and Measures Act*, 1878.

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, FEBRUARY 3, 1880.

Circular to Gas Companies.

AMONG the commonly accepted recommendations of the electric light is its reputed immunity from danger, whether to property or life. It has been generally supposed that when the electric light is in use, perfect safety is ensured. Such, however, does not appear to be the fact, for the grandest of our national book collections—that at the British Museum—was recently imperilled in consequence of the falling of pieces of incandescent carbon from the lanterns hung from the dome of the reading-room, and this has threatened on two occasions recently to produce very serious damage. Of course, nothing can be more easy than to put glass saucers beneath the lanterns, to catch the pieces of red-hot carbon projected from the poles. But it is a very serious matter, when risks, such as those to which our national library was a short time since exposed, are considered. Within a short time of one another, two accidents have happened which might have been attended with serious consequences to the reading-room. The glass saucers now used may avert all danger in the future, but the fact nevertheless remains that twice the magnificent reading-room at the British Museum has been in danger of destruction by fire, in consequence of the use therein of the electric light. The authorities of the Museum never have, we believe, given gas the opportunity of illuminating their splendid dome, which really, except on foggy days, never requires lighting up. Why it should be illuminated in the evening we, with every sympathy with poor clerks and working men, fail to see. We were once attentive readers in the afternoon, and generally found that one-half of our associates were, so far as we could see, indulging in useless amusement. There is not the slightest possible necessity for the opening of the British Museum library in the evening, so as to necessitate the use of artificial light. We have an intimate acquaintance with one public library which was resorted to on an evening by two sets of readers. The one were old "fogies," who frequented the news-room; the other were school-boys, who "crammed" from the translations of classical authors which they found on the shelves. The latter class would, in all probability, predominate in Great Russell Street, for nothing is easier than to procure a reader's ticket. The "working man" would never put in an appearance, much as his longing for information might prompt him, as the hours when reading is allowed must necessarily be short. It may be a great misfortune that that much-petted working man cannot be afforded more facilities for the acquisition of useful knowledge; but we fear that if the reading-room at the British Museum were thrown open to him altogether, he would not avail himself of his opportunities, except as a matter of vulgar curiosity. The real workers in the library—the Carlyles, the Macaulays, and the Buckles—have their opportunities in the daytime. The instances of working men who have employed their evening leisure for the benefit of their fellow-workers are, we fear, very few; but we shall be happy to see their numbers increase. If the use of the electric light at the British Museum tended to assist in the progress of the education of the working man, which we desire to witness, we should be satisfied to see the electric light in use, always supposing that no danger to our grand national institution is incurred.

But danger to national property is not the only thing involved in the employment of the electric light. It would seem, from newspaper reports, that danger to life may also ensue when the light is employed—that is, of course, supposing men to be foolish. We give for what it is worth the story of an accident which recently occurred at Aston, near Birmingham. A bandsman is reported to have seized the two conducting wires supplying electricity to several lamps—we are not told how many—at the public gardens at Aston, when he was immediately stricken down, and died shortly afterwards. The doctors say that he died of an electric shock. How he received the electric shock, under the system there employed for the production of the electric light, we fail altogether to see. Coroners, doctors, and juries, when they lay their heads together, no doubt arrive at most accurate conclusions; but in this case we fear they mistook a simple instance of apoplexy or heart disease for death by an "electric shock."

We shall not enumerate among the dangers of electricity the risk of life which ensues by coming in contact with the wires conveying electric force. To say the truth, we do not believe in these dangers, and the story we have related above we regard as altogether apocryphal. Many things besides an electric shock will bring men to a sudden death, and in the evidence in the case we have before us we cannot see any proof that the death of the man was occasioned by a shock. It must nevertheless be carefully borne in mind that danger unquestionably results from the reckless use of electricity. We ourselves have suffered from shocks, but it was in days when moist batteries and interrupted currents were used. Now, when a wire conveys electricity from Valentia to New York, nobody would be inconvenienced by handling the cable. Unfortunately, a good deal of ignorance prevails as to the effect of electricity on the animal system. Strictly speaking, all our knowledge of the effects of electricity on human life is derived from the consequences of thunderstorms and lightning-strokes.

The London and St. Katherine's Docks Company are advertising for tenders for lighting, by means of electricity, the quays and warehouses of the Victoria Docks. The advertisement specifies that some of the lights on the quays shall be moveable, and applicable to the illumination of ships. As regards the lighting of the interiors of the warehouses, it is stipulated that the lamps shall be moveable, in which, always supposing that everything we are told of the electric light is true, there will be no difficulty. If a man is willing to drag a copper wire after him, and carry a lamp, he may go

from the crypt to the ball of St. Paul's, and exhibit a brilliant light at every step of his journey.

Still referring to the electric light, we may note that there is a dispute going on just now as to which light—gas or the electric—answers best for illuminating our streets in the fogs which have recently unhappily visited us. Our own experience goes to show that the light obtained from the combustion of coal gas is more penetrating than that produced by the electric arc. If we could only have gas-burners of sufficient capacity, such as Sugg's or Wigham's, our thoroughfares would be well illuminated. In the absence of these, the multiplication of the gas-lamps and pillars now in use would be an immense boon; but the parsimony of our Vestries and other Local Authorities will stand in the way of any improvement in street lighting, unless that much more expensive and not half so agreeable electric light takes the place of coal gas.

Always supposing we can rely upon the reports which reach us in the American journals, the Edison light, if perfected, will be very far from cheap. In fact, it is acknowledged in America, where gas is much dearer than in this country, that it can very successfully compete with the electric force in the production of light. In another column will be found some facts concerning the calculated cost of a supply of the electric light, on Mr. Edison's last system, to the city of Baltimore. It is perfectly clear that the light, even with the latest claimed invention, would be enormously dearer than the equal illumination of the city by gas.

Illuminated buoys are voted to be a success. Our readers, however, know that we have no great admiration for Pintsch's lights in railway carriages, and consider that a buoy at sea, with a mere spark on the top of it, can be of very little use in guiding a mariner. The old story of the star-fish is revived by this invention. If we could get the star-fishes from the bottom of the ocean, and be certain they emitted light, Pintsch and his system would be at a discount. Mr. Sugg may presently provide a better light, but we can never suppose that a buoy with a spark on the top of it can be of the smallest use at sea. Will the inventors give us an account of the advantages of one of their gas-lighted buoys in the recent Channel fogs?

The proper material to be used for the conveyance of gas in private houses has always been a question. Iron pipes with T-pieces and elbow joints will find their way over any house, though it must be confessed that leaden pipes lend themselves with greater adaptability; but these, it appears, have their disadvantages. The mischievous rodent who infests our houses is, by his very nature, compelled to exercise his teeth upon some material, and he usually chooses the least resisting. More than this, he is a thirsty, and, bad as his character may be, is a particularly clean animal. Hence a love for water, which compels him to exercise his teeth on pipes he imagines convey that liquid. But unhappily he sometimes mistakes a pipe which carries gas, and, using his teeth, he pierces a hole, which, of course, admits the escape of the gas. In the north-western part of the Metropolis an accident of this kind recently happened, as a result of which, happily, no explosion occurred. What is the moral? To carry, at all events through the basements of buildings, iron services with elbow joints and T-pieces. Upstairs, composition pipes may be safely used; but down below, especially where rats are prevalent, iron services will be the best to employ.

We are happy to announce that the Reading Town Council and the Gas Company have come to an amicable arrangement, so that no opposition will be offered on the part of the Corporation to the Bill now being promoted by the Company. The latter have made some important concessions, which, to our mind, were not essential to the success of their Bill. Notwithstanding, we are glad the two bodies have come to terms.

The annual report recently issued by the West of Scotland Association of Gas Managers is a valuable document. It gives us, as we have said in past years, most interesting particulars as to the production of gas in Scottish works. We could wish, as we have before remarked, that the British Association would issue a similar return for England. It would, for example, be a matter of great interest to know the quality and quantity of gas which is obtained from coals in different localities. We can easily tell, from the illuminating power of the gas supplied, that cannel must be almost exclusively employed in Scottish undertakings. The illuminating power appears to range from 33 to 24 candles, according to the report, we notice; but, oddly enough, into this report of the West of Scotland Association enter notices of the gas affairs at Aberavon (Glamorgan), where the quality of the gas supplied is reported to be 14·5 candles, and at Bandon (co. Cork), where it is also 14·5 candles.

PROVISIONAL ORDERS FOR 1880.

Provisional Orders seem to be more in favour than Bills, with certain Companies, and it is not to be wondered at, considering the reasonable cost at which they can be obtained. For the forthcoming session of Parliament there are ten applications to the Board of Trade or to the Local Government Board for Orders relating to gas undertakings. We shall take them in their alphabetical order, as follows:—

The first is the *Chew Magna Gas Order*, promoted by the Chew Magna Gas Company, Limited, for the purpose of obtaining some further powers in relation to their undertaking. The Company seek authority to construct additional works on a piece of land described in a schedule. Gas of fourteen-candle illuminating power is proposed to be furnished, at a maximum price of 7s. 6d. per thousand feet. The usual day and night pressures are prescribed. No fresh capital is asked for.

The *Conway Gas Order*, for which application is made to the Local Government Board, is to authorize the Corporation of that borough to continue works for manufacturing, storing, and distributing gas, and for this purpose to borrow an indefinite sum of money, which is to be repaid by means of a sinking-fund in the course of sixty years. The maximum price which the framers of the Order propose to charge for gas is 8s. per thousand feet, and the Order will allow that the expenses of obtaining it may be defrayed out of profits when the price of gas is below 7s. 6d. per thousand feet. As soon as the price sinks to below 3s. 6d. per thousand feet, but not before, any excess of profit may be carried to the district fund. The gas proposed to be supplied is to have the illuminating power of fourteen candles, and it is to be furnished at a pressure of five-tenths between the hours of sunrise and sunset, and eight-tenths from sunset to sunrise.

The *Garstang Gas Order* fixes the capital of the Garstang Gas Company, Limited, at £2000, until authority is given by another Order, or by an Act of Parliament, to increase it. The Order proposes a supply of fourteen-candle gas at a maximum price of 7s. 6d. per thousand feet. The test burner is to be Sugg's "London" Argand, No. 1, and the testing-station is to be at the works.

The *Halstead Gas Order* is to authorize the Halstead Gas Company, Limited, to construct and maintain gas-works for supplying gas to the parish of Halstead, in Essex. The Company started with a share capital of £10,000, and the Order proposes the raising of another £10,000. The new capital is to be offered to the public by auction or tender, and, as usual, no lot is to be of more than £100 value. The original capital will, of course, be entitled, subject to the sliding scale, to ten per cent., and the additional to six or seven per cent., according as it is raised as preference or ordinary capital. As the Company do not appear to have borrowed any money on their original capital, they seek power to raise £5000 on their aggregate capital of £20,000. The standard price for gas, subject to the sliding scale, is to be 5s. 6d. per thousand feet. Gas of fourteen-candle illuminating power is proposed to be supplied, tested by Sugg's "London" Argand burner, No. 1, at the customary day and night pressures.

The *Harrogate Gas Order* is to authorize the Harrogate Gas Company to raise additional capital to the amount of £60,000, and to borrow on mortgage £20,000. The dividends on the new capital are to be limited to six or seven per cent., according as it is raised as preference or ordinary.

The *Holywell Gas Orders* are, on the one hand, to enable the British Gaslight Company, Limited, to apply a further sum of £10,000 towards their Holywell undertaking. The present capital chargeable to these works is £10,413, upon which ten per cent. is, of course, paid. The additional sum asked for in the Order will be entitled to a dividend of six or seven per cent., according as it is issued as preference or ordinary capital. Borrowing powers to the amount of £5000 are sought. The Company propose to supply fourteen-candle gas at a maximum price of 6s. per thousand feet, tested by Sugg's "London" Argand burner, No. 1. The usual day and night pressures are prescribed.

In competition with the preceding Order is one promoted by the Local Authority of Holywell. In it a proposal is made to purchase by agreement, but not otherwise, the undertaking of the British Gas Company. The Local Board, if they obtain the works, propose to supply fourteen-candle gas at a maximum price of 5s. 6d. per thousand feet, tested by Sugg's "London" Argand burner, No. 1; the ordinary day and night pressures being prescribed.

The *Long Eaton Gas Order* proposes to enable the Long Eaton Gas Company, Limited, to construct some additional works, for which purpose they seek power to raise the sum of £14,000. Their present capital is £16,000, entitled to ten

per cent. dividend; and the new capital will be entitled to six or seven per cent., according as it is raised as preference or ordinary. Borrowing powers to the extent of £6000 are prayed for. The new capital is proposed to be offered by auction or tender, the premiums to be applied as usual. Gas of fourteen-candle power is proposed to be supplied, tested by Sugg's "London" Argand burner, No. 1. The standard price, subject to the sliding scale, is proposed to be 5s. 6d. per thousand feet within Long Eaton, and 6s. 6d. beyond. The customary day and night pressures are prescribed.

The *Stone Gas Order* was mentioned in our last issue. It is promoted by the Local Board for the purpose of setting up works in competition with the Gas Company. Power is asked to borrow, for gas purposes, an indefinite sum of money, to be repaid, by means of a sinking-fund, in the course of sixty years. Gas of fourteen-candle power is proposed to be supplied, at a maximum price of 4s. per thousand feet. The usual day and night pressures are prescribed.

The *Trowbridge Gas Order* proposes to enable the British Gaslight Company, Limited, to expend a further sum of £20,000 on their Trowbridge undertaking. The present capital chargeable to these works is £20,253, entitled to ten per cent.; and the new capital will bear interest at the rate of six or seven per cent., according as it is raised as preference or ordinary. Borrowing powers to the extent of £10,000 are sought. Gas of fourteen-candle power is proposed to be supplied, tested by Sugg's "London" Argand burner, No. 1, at a maximum price of 4s. 6d. per thousand feet, and it is to be delivered at the ordinary day and night pressures.

There are eight Orders, as follows, in reference to water undertakings:—

The *Broadstairs Water Order* proposes to enable the Broadstairs Water-Works Company to raise a further sum of £16,000, and to borrow £4000, for the purposes of their undertaking. The new capital is to be entitled to six or seven per cent., according as it is raised as preference or ordinary.

The *East Blatchington and Seaford Water Order* is to give statutory authority to what is at present carried on as the private undertaking of Mr. R. Lambe, of East Blatchington, which is intended to furnish a supply of water to Seaford and East Blatchington. The source of water is to be a well in the last-named place. The undertaker proposes to charge ordinary rates for a domestic supply, but some of the extras are rather high. The Order will allow the undertaker to raise capital to the amount of £10,000, and to borrow to the extent of a quarter of that sum. As usual, the quality of the water is to be the best obtainable from the source.

The *Gisborough Water Order* is to authorize Mr. T. Chaloner, of Gisborough, to raise a further sum of £11,000 for the extension of his private undertaking at that place.

The *Harrogate Water Order* proposes to enable the Harrogate Water-Works Company to raise a further sum of £40,000, and to borrow £10,000, for the extension of their works. The dividends on the new capital are limited to six or seven per cent., according as it is raised by preference or ordinary shares. The works which will be authorized by the Order have been partially constructed, and the capital now asked for is required for their completion.

The *Luton Water Order* proposes to authorize the Luton Water Company to raise a further sum of £30,000 for the extension of their works, and to borrow £7500. The new capital will be entitled to six or seven per cent., according as it is raised as preference or ordinary.

The *Newhaven and Denton Water-Works Order* is to authorize the construction of works for furnishing a supply of water to Newhaven and Denton, in Sussex. The undertakers are the Earl of Sheffield and Mr. Henry Willett. The Order proposes a capital of £20,000, with corresponding borrowing powers. The source of the water is to be a well, of course in the chalk, in the parish of Newhaven. The rates proposed are ten per cent. on the annual value of houses below £20, and eight per cent. above. For water-closets more than one, 10s. each is to be charged, and for baths 12s. 6d. each. These rates, it must be admitted, are rather high.

The *Norwood (Middlesex) Water Order* is applied for to authorize the Norwood (Middlesex) Water-Works Company, Limited, to raise a further sum of £60,000, for the purpose of enabling them to furnish a better supply of water to Hayes, Hillingdon, and the remainder of their limits, and to borrow £15,000.

The *Pwllheli Water Order* proposes to fix the capital of the private undertaking of Mr. A. E. Pownall at £8000, with a power to borrow £2000. The rates proposed are somewhat higher than usually obtain in rural districts.

URBAN WATER SUPPLY.

In former articles (see *ante*, pp. 12, 88) we have endeavoured to bring before our readers some facts on this important subject, communicated in the Return lately made to an Order of the House of Commons, "showing the means by which drinkable water is supplied to every Urban Sanitary District in England and Wales." To bring the facts conveniently before our readers, we took into consideration at first the towns within the drainage area of the Thames, and in doing so had occasion to point out the extremely imperfect state of the information supplied in the Blue-book, both as regards the towns in that district—many of considerable importance being excluded altogether—and also as to statistics, a large number of the returns made being simply a declaration of utter ignorance on the subject on the part of the authorities consulted. We now proceed to consider the case of another very important drainage area—that of the Severn.

The Severn, as a river, differs very greatly in all respects from the Thames. Its sources, and those of all the tributaries on the right bank, are among the mountains of Wales, while those of the many tributaries entering from the left bank are in the comparatively low elevations of the new red sandstone in the middle of England, and the higher oolitic ridge of the Cotswolds. On the right bank there are few towns and not much cultivation; on the left bank, a multitude of towns and important manufacturing districts. The rainfall on the one side of the river is very heavy, and often torrential; on the other side it is smaller in amount, and more distributed. The tributaries upon the right bank are bright, pure streams, varying enormously in their volume at different seasons; those on the latter are more or less muddy, and not much subject to heavy floods. The rainfall on the Upper Severn and in the Vyrnwy Valley is nearly 64 inches; over the country traversed by the Wye it is 32 inches; and over the Usk and the Taff Valleys it reaches 46 inches. In the valleys of the streams coming from, and flowing over the new red sandstone, the rainfall hardly exceeds 26 inches, but in those draining the oolites and the limestones of the Mendip Hills it amounts to 37½ inches.

We have before us a list of 134 towns in this drainage area, but only 86 of them are referred to in the returns, and of a large number of these the information concerning water supply amounts to nothing. We will proceed briefly to discuss the returns made with reference to these 86 towns.

On the River Severn, as on the Thames, the number of large towns is very small. There are but three the population of which is above 10,000, and six between 5000 and 10,000. There are sixteen smaller towns of which the drainage belongs to the Severn proper, though several of them—such as Wenlock, Malvern, and Berkeley—are not situated upon, nor are they very near the stream.

Newtown, in Montgomeryshire, is the first town on the Severn of which we have any account. It has a constant supply from a watershed of 1200 acres in the Kerry Hills, the water being received into a reservoir and distributed unfiltered. The works are constructed to supply 200,000 gallons per day, or an average of about 34 gallons per head, at a cost of 30s. 10d. per head of population, but as yet only about one-third of the town is under supply. The charge for the water appears to be at the rate of 5·64d. per thousand gallons. Welshpool has a constant supply from a lake, the water being conveyed thence to a reservoir, and filtered. The daily supply is stated in one column at 20 gallons, and in another at 40 gallons per head; the cost of works has been not more than 15s. 4d. per head of population, and the charge is not more than 1½d. per thousand gallons if the supply is 20 gallons per day, and only ¾d. if 40 gallons. Shrewsbury is supplied chiefly from the Severn, but partly from springs in the new red sandstone, although only one-sixteenth part of the whole is from the latter source. The supply from the river is intermittent, and not filtered. The total quantity supplied daily is about 27 gallons per head. The cost of works, as purchased from a Company by the Corporation, was about 27s. per head of population, and the charge for water is 8·2d. per thousand gallons.

From Shrewsbury to Worcester are several important towns on and near the Severn, but in the returns no information is afforded as to water supply, except as regards Bridgnorth, where a copious supply from a spring is conveyed to the inhabitants free of charge. Worcester, like Shrewsbury, is supplied from the Severn, a quantity equivalent to about 30 gallons per head being pumped into a reservoir, and delivered, after filtration, in a constant supply. The cost of works was about 30s. per head of population, and the average charge is 2d. per thousand gallons. Malvern is supplied from springs in the hills adjacent. The quantity is only 9 gallons

per day; but the supply is constant, except when, owing to continued drought, the amount of water available is inadequate. The cost of works is stated at nearly 95s. per head of population, and the charge for water is 6·6d. per thousand gallons. Tewkesbury, like Worcester, is supplied with filtered Severn water, and till the passing of a recent Act authorizing the purchase of the Cheltenham Water-Works by the Corporation of that town, it was supplied by the Cheltenham Water Company. No particulars are given of the water supply of either Cheltenham or Tewkesbury pending the transfer of the works. Charlton Kings and Leckhampton both belong to Cheltenham, and were chiefly supplied by the Company. Gloucester has a constant supply from reservoirs receiving the collected waters of several small streams. The quantity in summer is about 17 gallons per head per day, but is somewhat uncertain, and is regarded as insufficient. The cost of works has been nearly £3 per head of population, and the charge, estimated upon the stated supply, is 5·6d. per thousand gallons. Clevedon, at the mouth of the Severn, has a constant supply of 32 gallons per head per day from springs in limestone rock. The cost of works has been more than £3 per head, and the charge for water is 6d. per thousand gallons.

Of the sub-basins of the rivers entering the Severn from the right bank, no information is given, except as regards a few of the towns on the Wye and the Usk. The first town on the Wye is Builth, situated in the mountains near the source of that river. It is supplied with spring water to the extent of nearly 20 gallons per head per day, the supply being constant and sufficient. The cost of the works was nearly 30s. per head of population, and the charge for water is 5·6d. per thousand gallons. The town of Hay is also supplied from springs, and the quantity is said to be sufficient, but is not stated. Hereford has a constant supply of filtered river water from the Wye to the extent of about 27 gallons per head per day. The cost per head of the works was 21s. 9d., and the charge is 3·3d. per thousand gallons. Leominster is supplied from a well and adits driven to increase the yield. The supply is constant and sufficient, being at the rate of 20 gallons per head per day. The cost of works per head of population was 26s. 2d., and the charge per thousand gallons is 3·2d. Coleford is described as having an ample supply from natural springs conveyed to the town, but not distributed, and Monmouth is supplied by a Company at the rate of 40 gallons per head per day, the water being taken unfiltered from the River Wye. The cost of works and the charge for water are not given. Lastly, we are told that Chepstow has a constant supply of filtered spring water to the extent of 30 gallons per head per day in the hands of a Company, the capital cost of works having been equivalent to 40s. per head of population, and the charge for water being only 1½d. per thousand gallons. Two towns on the Wye—Kington and Ross—are also described as being supplied by Companies, but no other information is given. Seven towns in the Wye drainage area are not mentioned in the returns.

The Usk drainage area contains seventeen towns, some of them large and populous. All, except Brecknock, Crickhowel, and Caerphilly, are mentioned in the returns, but information is given concerning six only. Usk has no works and no regular supply. Panteg, Blaenavon, and Caerleon receive water from wells and springs, but no details are given. Abersychan is described as in the hands of a Company. Pontypool, which also supplies Upper Llanfrechna, is likewise supplied by a Company. In neither case is any return made. Abertillery is said to be in treaty for a supply. Abergavenny has a constant supply from mountain springs brought direct into the mains. Upwards of 40 gallons per head per day are taken. The works have cost nearly 21s. per head of population, and the charge per thousand gallons is 4·1d. Tredegar has a constant supply of about 5 gallons per head per day of surface water, partly springs, at a charge of 8·8d. per thousand gallons. Newport has from a Company a constant supply, obtained from springs and brooks, of 55 gallons per head per day. The capital expended is at the rate of £3 14s. per head of population, and the charge for water is at the rate of 3·4d. per thousand gallons. The waste is extreme. Rhymney is said to have a daily supply of only 4 gallons per house, the water being collected from the mountains into a pond, and thence conveyed two miles to a reservoir along the bed of a stream. It is then filtered before being distributed. The cost of works has been at the rate of 22s. per head of population. There is probably some mistake about the quantity delivered. Ebbw Vale has a constant supply of about 15 gallons per head per day, obtained from the River Ebbw, nd collected into a reservoir. The cost of works is stated at £2 16s. 6d. per head of population, but no rates are yet charged. Lastly, Brynmawr has a constant supply of 10 gallons per head per day from a catchment area at a high level, the water being stored and filtered. The cost of works has been very small (only 10s. 6d. per head of population), but the charge is 3·1d. per thousand gallons. The supply available is said to be half as much again as the quantity actually required.

It will be evident from the foregoing statement that several of the towns have river water supplied not always after filtration, the Severn water being used in most of the large towns on its banks. The cost of the works and the charge for the water varies a good deal, but is decidedly higher than in the Basin of the Thames. The proportion of towns provided with any regular supply is small, hardly exceeding one-third of the whole number. The quality of the water supplied is not alluded to in the returns, but with few exceptions it is probably good.

It will be seen that hitherto we have only considered the towns that are in the drainage areas on the western side of the Severn Basin, where there is heavy rainfall, and the sources of the streams are all pure and unpolluted. In another article we propose to take the tributaries entering on the left, or northern and eastern banks of the Severn.

THE OUTFALL SEWERS ON THE THAMES.

A long pause is now to take place in the arbitration on the Thames sewage outfalls. Twenty days have been occupied by the proceedings, and now the inquiry stands over until the 1st proximo. This protracted adjournment is understood to be mainly caused by the numerous engagements of the Umpire —Sir Charles Hartley. The delay is of no particular consequence, especially as the attention of the public has not been engaged in following the case very closely. A "horrid "murder" would have occupied many columns of the daily press, and every examination of the accused would have been reported almost verbatim. But, despite all the accusations levied against the outfalls, and all that has been said concerning the "sewage zone," there has been no great excitement shown with regard to the conflict between the Thames Conservators and the Metropolitan Board. When the climax comes, no doubt there will be considerable discussion, unless some political crisis should intervene. It has been arranged that when the inquiry is resumed the evidence shall go on for four days consecutively, after which a further adjournment is to take place until March 9 and 10 for the speeches of counsel. The case for the Conservators came to an end on the fourteenth day of the inquiry. At least the Umpire said, "We will consider it closed;" and Mr. Bidder proceeded to address the tribunal on behalf of the Metropolitan Board. On the following day Sir Joseph Bazalgette was examined, and at subsequent dates there were other witnesses, including Mr. A. M. Rendel, Engineer to the Victoria Docks, Mr. Henry Law, Mr. Thomas Hawksley, and Mr. T. W. Keates, Chemist to the Metropolitan Board. The evidence of Mr. Keates has been only partially given, the adjournment taking place before the completion of this gentleman's statement. It is obvious that the case for the Metropolitan Board depends, to a large extent, on the evidence of this witness, who, as yet, has only dealt with one out of the three divisions into which he has separated his subject. Altogether, including the cross-examination, we may expect that Mr. Keates will occupy the attention of the Arbitrators for at least a couple of days longer.

Concerning the nature of the defence to be offered by the Metropolitan Board, we find it very distinctly stated in Mr. Bidder's address, that the evidence of Dr. Tidy as to the presence of sewage will not be disputed. It is admitted that sewage exists in the mud-banks near Crossness and Barking, and not only so, "but that it pollutes the whole of the river, "and enters into the combination of every mud-bank from "Teddington to Erith." But it is contended that while the quantity of matter which comes from the sewers is utterly insufficient to account for the banks, there is abundance of material from other sources much more than sufficient to account for all the mud-banks in the river. We may observe that if the witnesses for the Metropolitan Board are going to acknowledge that sewage from the great outfalls pollutes the river and mingles with the mud-banks all the way from Erith to Teddington, they are putting a very dangerous weapon into the hands of their opponents. Mr. Bidder, it is true, contends that the sewage manifests itself in a very small proportion. Acknowledging the presence, he denies the quantity. He says Dr. Tidy has himself admitted that the microscopic investigation which he recently carried out proved nothing as to quantity. "It shows the presence of sewage matter,"

argues Mr. Bidder, "but whether it be one-tenth of the bank "or one-millionth of the bank he does not give you any "indication of whatever."

Mr. Bidder's address was a short one, and he signified that he should have more to say at the close of his case. We apprehend it is intended to be shown that the Thames in the neighbourhood of London is necessarily a dirty river, independently of the outfalls, and that what is called "sewage" is in many cases polluting matter which never entered the sewers. The thousands of people on board the shipping in the Pool and elsewhere will account for a good deal. The storm overflows contribute something, as also the barge population, and a number of unobserved outlets from river-side premises, to say nothing of the dead dogs and cats which drift about everywhere. For the term "sewage" we may in some cases substitute Dr. Frankland's favourite phrase, "animal con-"tamination," meaning that which may or may not have passed through the sewers. It is quite possible to account for Dr. Tidy's results without admitting anything that would substantiate the case of the Conservators, or that would justify the report made by Captain Calver. It is well to be bold; but it is possible to be too bold, and we think the Counsel for the Metropolitan Board has erred rather in the latter direction, though he is careful to point out that the mere presence of "sewage" in the specified mud-banks is not sufficient to give his opponents the victory. He even goes so far as to argue that if the banks in question were proved to be wholly sewage, the fact would not be sufficient to condemn the outfalls. Mr. Bidder argues that the banks may have been caused by something which was independent of the sewers, even though "every "atom of those banks was sewage." The point is raised that mud-banks and shoals will exist somewhere, and that it is impossible to give the Thames more than a certain width and depth in a given part. Hence, as the Conservators dredged away one set of shoals they created another set. If a shoal be taken from the south side another appears on the north side, and *vice versâ*. Thus Mr. Bidder arrives at the result "that the formation of these banks is the inevitable result "of that which has been done by the Conservators and others "at those points." The river can only keep open a certain sectional area, and if, by dredging, this be enlarged in one place, the natural action of the stream will establish a compensation by a deposition of mud in a new spot.

Mr. Bidder takes up a position which appears perfectly consistent with the cause he defends when he says: "It is "impossible to come to any other conclusion but that the "proportion of matter from the sewers in the banks is ex-"tremely insignificant." His position is also clear when he says that the banks complained of are like all other mud-banks in the Thames, and like all mud-banks that were in the river before the outfalls existed. On the question of quantity he also makes a strong stand. Great care is taken to exclude the road-drift from the sewers, and there is evidence that these efforts are, in the main, successful. Sir J. Bazalgette stated that there were more than sixty thousand catch-pits in the Metropolis, and above a hundred and thirty thousand tons of material had been removed from them during the year. One-third of this quantity would be water, and the rest detritus. From the sewers rather more than twenty-six thousand tons were removed in the course of the year. Practically, there was no detritus found at the gratings of the pumping-stations, and absolutely none in the sewage reservoirs. In short, "there "never was any detritus in the sewers below the pumping-"station. They had never been cleansed since the opening, "and did not require it now." On the southern side some detritus had been taken out of the sewers, "but that was "chiefly caused by the formation of new roads at Charlton."

The evidence of Mr. Keates has thus far related only to the amount of matter suspended in the sewage. He took the gross quantity of sewage coming down to the outfalls at one hundred and twenty millions of gallons in the twenty-four hours. Taking the average at twenty-three grains of suspended matter per gallon, this gave about one hundred and seventy-six tons per day, or rather more than sixty-four thousand tons in a year. This is dry matter, obtained with a temperature of 230° Fahr. The suspended matter previous to drying contained about sixty per cent of water. Nearly two-thirds of the solid matter would be organic, which would decompose into the gaseous and liquid state, and so pass away. Supposing the mud-banks were made exclusively from matter derived from the sewers, the annual accretion would be twenty-two thousand tons of mineral matter, to which might be added two thousand tons of organic, making a total of twenty-four thousand tons. Of course it is unreasonable to suppose that all this goes directly into the composition of the three particular mud-banks complained of. The banks themselves contain nearly one million four hundred thousand tons of mud. Reckoning that the outfalls have been in operation fourteen years, they could not have contributed quite so much as a quarter of a million tons of solid matter to these banks in that length of time. It may be said that the mud-banks are partly water, and that we should make an allowance for this. If they are half water, this would double the effect of the solid sewage matter, making it equivalent to nearly half a million tons. Remembering how much must go elsewhere, and seeing that the banks contain a far greater quantity than can possibly come from the sewers, even if we reckon the whole of it, it may be fairly argued that the mud-banks are substantially caused by deposited matter, independent of the outfalls. However, we shall hear yet more on this point; and there is the probability that the final decision will attribute to the outfall sewers some share in the formation of the mud-banks, though in what degree we cannot anticipate. We are only struck with the fact that Mr. Bidder, in his address, endeavoured to extricate his clients from the mud-banks by distributing the outfall discharge over the whole tidal sweep of the river.

Correspondence.

[*We do not hold ourselves responsible for the opinions expressed by Correspondents.*]

THE HYDRAULIC MAIN.

Sir,—I feel that it would be scant courtesy to Mr. R. H. Patterson to remain silent when he appeals, as he does at the conclusion of his valuable contribution to your columns on the subject of the hydraulic main, for either my or Mr. West's experience of "White's apparatus." Hence I break a silence which I intended to maintain a while longer, until, by prolonged experience, I could state my views without the somewhat qualifying admission of short acquaintance with this, as I regard it, very important invention.

My opinion is that the hydraulic main is no longer a necessary part of a retort-stack. I have provided one in the new works at Tunbridge Wells, on the principle which, in general professional practice as well as in common life, I favour, of having "two strings to one's bow;" but, unless some unforeseen difficulty or derangement occurs, the hydraulic main will never be used, nor the dip-pipes ever be sealed. They are there, and although I conceive they may *possibly* be required to fall back upon, I do not think the contingency is in the remotest degree probable.

"White's apparatus" has given me great satisfaction; and, when used in combination with the steam-jet exhauster, there is not the slightest difficulty in keeping an absolutely steady gauge, the passage between the valve and the retort being perfectly unobstructed by dip-pipes—so steady, indeed, as to lead a casual observer to doubt the possibility of its being in action, notwithstanding the disturbing influences resulting from drawing and charging retorts. The only governors I use at Tunbridge Wells, between the retorts and the gasholders, are those in connection with the steam-jet exhausters.

As it is my intention very soon to publish my views on "Modern Gas Manufacture," as illustrated at these works, I shall abstain for the present from going further into the various questions raised and ably dealt with by Mr. Patterson, and illustrated in part by the experience and investigations of Mr. George Livesey and Mr. Young; all being matters of exceedingly great interest, and deserving careful attention.

R. P. Spice.

21, *Parliament Street, Westminster, S.W., Jan.* 28, 1880.

FROZEN LAMP SERVICES.

Sir,—Mr. T. Gilcriest, of Sligo, holds, I think, a wrong idea about frozen lamp services, if he thinks they are caused by an insufficient fall to the main-pipe. The reason he is seldom or never troubled with this inconvenience is, that the winter climate of Ireland is uncommonly warm, in consequence of the heat given off by the Gulf Stream. For instance, the meteorological observations at Valentia, Cork, and Mullaghmore hardly ever note the temperature below freezing point. Scotland and the eastern parts of England now and then have greater cold, caused by easterly winds from the Continent, and the thermometer sinks to 20° or, though very seldom, to 15° Fahr., at which temperature there will perhaps be a good many frozen services every night. Now, on the Continent—say in Germany, where the cold varied between + 5° and − 13° Fahr. during the four weeks December frost period of 1879—gas-works were very much troubled with frozen lamps, so that 10 to 15 per cent. of the public lamps used to be stopped up.

The explanation is very simple. The gas as it enters the holders is at a temperature of, say, 50° Fahr., and cools down to perhaps 2° or 3° above the day temperature, which is generally about freezing point when the sun is shining. On being discharged into the public mains in the evening, it is not cooled down any farther, because the ground at a depth of 2½ to 3 inches only freezes after several weeks of intense cold. (The calamity of frozen services sets in at the same time as every strong frost.) From there it enters the lamp service, and as soon as it arrives above ground is subjected to a cold of, say, 5° Fahr. The moisture it contained in the ground, corresponding to a temperature of 37° Fahr., must be condensed at great velocity until the moisture in the gas is reduced to that quantity which it can hold in solution at about 5° Fahr. This condensed water settles down on the inner surface of the pipe in the form of hoar frost, choking a ¾ or 1 inch pipe in a very short time.

The best remedy is strong spirits of wine or absolute alcohol, which, in absorbing the moisture of the ice, gets heated to a certain extent

and dissolves the crystals. It is a well-known fact that if, after a long period of strong frost, thawing sets in, and the ice inside the lamp service (in the column) begins to melt, the water, on reaching the ground part of the service, freezes again, in consequence of the temperature of the ground still being, perhaps, 5° or more below freezing point, and a greater number of lamps will now and then be seen frozen up than at the time of the frost.

As to Mr. John M'Crae's method of applying hydrochloric acid and hot water, it appears to me that great difficulty would be experienced in finding the hot water, unless every man sent out to open services were supplied with a stove, &c.; besides, the acid would prove rather destructive if frequently applied.

The best plan is, I consider, to send the gas into the mains in a perfectly dry state, and the difficulties of ice and naphthaline stoppages would be done away with. The proposal was made long ago, but I have not heard of its having been carried out in more than one or two places, nor do I know what the general effects have been.

Aix-la-Chapelle, Jan. 22, 1880. C. R. J. Pepys.

Sir,—Several of my brother managers have given their experience in this matter, and some of them have taken a great deal of trouble in trying various remedies to drive out the bugbear. Mr. M'Crae seems to have hit upon a plan for thawing the ice in lamp services; but I fear his remedy will leave a greater cause of trouble to the manager, and loss to his company, than the frost was to both. A correspondent in the Journal of Jan. 3 gives his experience in using methylated spirits in the frozen pipes, and this remedy I should think would not be fraught with the danger of eating away the iron, as Mr. M'Crae's may do; but as to one man clearing 50 lamps per day I will say nothing about.

I consider it is not so much expense that the manager or his company would care about as the clamour of the public, who make no allowance for the weather, and think we keep men hanging up behind the door, and can take one down at every beck and call, forgetting that when they are frozen out, others, and sometimes scores of them, are in the same fix. And worse than all is that sometimes even some of the directors who happen to be on the local boards, &c., are as unreasonable as the public, and not only think, but say, that the reason of the pipes stopping with the frost is that the services have not sufficient fall-back to the main. This is not correct, even though Mr. Gilcriest assures us such is the case. If it is so, how is that when the hydrochloric acid is introduced, together with a few pints of hot water, into each lamp service, the pipes are cleared? And, again, when the methylated spirits are poured into the pipes by "W. S. M'G.," why are not these service-pipes drowned out instead of being cleared? If it is condensation in the bend or any part of the horizontal service-pipe, why does it not cut the gas off at any time of the year, or as soon as the pipe is charged with condensed gas?

My experience is that, as a rule, it is not the horizontal part of the service-pipe that stops, but the bottom part of the upright pipe at the ground line that gets full of ice. This I have proved in several ways—first, by putting down the pipe a ¾-inch iron rod till it stopped, and then measuring by the rod the outside pipe; secondly, by placing a small fire against the bottom of the pipe till the lamp could be lighted; thirdly, by taking the stand-pipe out of the bend. This I did, and found in the bottom of the pipe a plug of ice 2 inches long, which caused the stoppage, while the gas would blow at the bend.

Does the above prove that the horizontal pipe is wrongly laid, or that the cause is condensation trickling down the pipe till it reaches the ground line, where it is frozen, and the constant trickling down to that place and freezing eventually stops the pipe altogether?

I have remedied the defect by using two old pails, which I have made into fire-baskets, and filled them with coke fires, taking with us a bushel of small coke in an iron barrow, with a piece of gas-pipe tied across the barrow handles, with a pail hung on each side. We place one pail against a bracket lamp-pipe, and the other is carried on to another lamp; but if it is a pillar lamp that is stopped, we put both pails to it—about fifteen minutes for a pillar lamp, and sometimes five minutes for a bracket lamp is sufficient. I mostly have two men at the work, as they have the pails, barrow, and ladder to take with them. They do about six lamps per hour.

Yesterday I tried a scheme that was recommended to me, which was to pour into the pipe about a quarter of a pint of naphtha. This is the best remedy I know of. Before trying the plan, I put a piece of ice about an inch square into a small tin, and poured on to it two tablespoonfuls of naphtha, and in a few minutes the bottom part of the ice began to dissolve. By this experiment I proved that the naphtha would remedy the defect. I at once secured a tin bottle, taking with me a man and a ladder, and commenced pouring into the lamp-pipes a little naphtha, going on from one to the other till I had visited about twenty, being the number of complaints for that day, and, with one exception, the whole of them are right; the faulty one being, in my opinion, choked with rust.

Basingstoke, Jan. 23, 1880, A. Thomas.

GAS COMPANIES ACCOUNTS.

Sir,—I should like to ask, through your columns, if any gas companies subject to the Gas-Works Clauses Act, 1871, have discontinued the custom of filing with the Clerk of the Peace their annual accounts, which they were required to file under the Gas-Works Clauses Act, 1847, clause 38.

Looking at the Gas-Works Clauses Amendment Act, 1871, clause 35, I find that certain companies are required to file their accounts with the local authorities by March 31 in each year; also to keep copies of the said accounts, and sell them to any applicant at 1s. per copy. This appears to be ample provision for all requirements of publicity, and will meet the references wanted by any interested parties. Therefore, in reading the first clause of the Amendment Act, 1871, I should suppose that the filing of accounts with the Clerk of the Peace under the Gas-Works Clauses Act, 1847, is inconsistent with the Act of 1871. Clause 1 reads as follows:—

"The Gas-Works Clauses Act, 1847, and this Act shall be construed together as one Act, and the provisions of this Act shall be held to repeal and supersede such provisions of that Act as are inconsistent with this Act."

Now, I should infer from this that the Legislature did not deem it necessary to enforce both of these clauses—*i.e.*, clause 38 of the old Act, and clause 35 of the new Act—but that the filing of accounts with the Clerk of the Peace was repealed. However, I should be glad to know from any of your readers, what is the practice of depositing their accounts—I mean such as are subject to the Gas-Works Clauses Amendment Act, 1871.

As I have been concerned in a case where the question is in dispute, and as the Clerk of the Peace charges an exorbitant fee, and local authorities do not charge anything in this locality, it is perfectly right that gas companies should have the benefit of the new Act, if the repeal of the old clause be intended.

Jan. 28, 1880. Questant.

Parliamentary Intelligence.

GAS AND WATER BILLS, 1880.

The examination of petitions for private Bills was resumed on Monday, the 26th ult., by Mr. Robinson, the junior Examiner, who continued his sittings day by day during the week. In the course of that time the whole of the remaining Bills relating to the supply of gas or water came before him, and in the case of each of the following (unopposed) petitions, the Standing Orders were declared to have been complied with:—Ackworth, Featherstone, and Purston Gas Bill; Cardiff Water-Works Bill; Chester Gas Bill; Dartford Gas Bill; Dearne Valley Water Bill; Doncaster Corporation Water Bill; Edinburgh and District Water Bill; Hull Lighting Bill; Hyde Gas Bill; Lancashire County Justices (Water) Bill; Lincoln Gas Bill; Liverpool United Gas Bill; Malton Gas Bill; Maidstone Gas Bill; Reading Gas Bill; Stafford Borough Bill; Wakefield Corporation Water Bill; Wandsworth and Putney Gas Bill; Wigan Improvement Bill; Yarmouth Water Bill.

The consideration of the Rathmines and Rathgar Township (Vartry Water Supply) Bill (opposed) and the Sligo Borough Water Bill (unopposed) was postponed until the 6th inst.; and of the Birkenhead Borough Bill and the South Metropolitan Gas Bill (both unopposed) until the 9th inst.

Legal Intelligence.

HIGH COURT OF JUSTICE OF IRELAND.

EXCHEQUER DIVISION—Dublin, Saturday, Jan. 24.

(*Before the* Lord Chief Baron, *and Barons* Fitzgerald *and* Dowse.)

CORPORATION OF KILKENNY *v.* KILKENNY GAS COMPANY.

This was an action of ejectment brought in respect of a portion of the premises upon which the gas-works in Kilkenny were recently erected. Defendants having made a lease of their works to Mr. George Anderson, of London, that gentleman obtained leave to appear and defend. In his defence he stated that his landlords had been in possession of the works for many years; that they had laid out large sums in extending and improving the works; and that the plaintiffs acquiesced in the expenditure. The defence also stated that the defendant during his tenancy of the works, now for a period of two years, had also expended large sums of money in like improvements, and, therefore, in point of equity, the action could not be sustained. The plaintiffs demurred to this defence, contending that it was no answer in point of law to the fact that the premises were held from the old Corporation by a lease of 1838, which, owing to the disabling Acts then affecting Corporations in Ireland, prevented them from executing a lease in the interval before the coming into operation of the Municipal Reform Act, and therefore that the lease was *ultra vires*.

Mr. Hemphill, Q.C., Mr. Morgan B. Kavanagh, and Mr. Philips appeared for the plaintiffs; Mr. W. H. Johnson, Q.C., and Mr. J. Roche for Mr. Anderson; and Mr. W. Ryan, Q.C., and Mr. J. Gibson attended to watch the proceedings on the part of the Gas Company, who had filed defences as to matters of fact, which will be submitted to a jury at the next Wicklow Assizes.

Mr. Kavanagh opened the demurrer, and in its support cited Acts of Parliament and authorities bearing on the question, for the purpose of showing that the Corporation had not the power at the time to execute the lease in question.

Mr. Roche replied on behalf of the lessee, and characterized the action as an unrighteous attempt to deprive improving tenants of the fruits of their industry and improvements. He contended that, even if the original lease were invalid, the Corporation, by letting (in 1870) a piece of adjoining land for the purpose of extending the works, had given validity to, and set up the original lease.

The hearing of the arguments having concluded, the Court reserved judgment.

Thursday, Jan. 29.

The Lord Chief Baron delivered judgment in this case to-day. He said it was a demurrer to an equitable defence by Mr. George Anderson, the lessee of the works. The ejectment had been brought by the plaintiffs against the defendant to recover possession of certain premises in the city of Kilkenny, upon which the defendant had erected gas-works, upon a notice to quit, alleging that the defendants were tenants from year to year to the Corporation. The defendants pleaded the statutable defence that they were in possession, and also an equitable defence that they were in possession under a lease from the Corporation, dated July, 1838, and upon the faith of that lease had spent large sums of money in erecting the works with the entire knowledge and acquiescence of the Corporation; and they claimed specific performance of the lease, or compensation for the money expended on the works. Counsel for the plaintiff demurred to the equitable defence, on the ground that the lease was made after the passing of the 6 & 7 William IV., cap. 1, which became law in 1836, and prohibited all alienation of corporate property pending the passing of the Municipal Corporations Act, 3 Vict., cap. 103, which Act, in sec. 140, prohibited the making of leases longer than 31 years; consequently the lease was void *ab initio*, and no specific performance of it could be granted, and the Corporation could not be ordered to pay compensation, as they would not have any power to levy a rate to pay it. He held that the lease was void *ab initio*, because it was made *ultra vires*, and contrary to Act of Parliament; and that, as the plaintiffs were a corporation, defendant was not entitled to any compensation, as there was no possible fund out of which to pay it. The demurrer was therefore allowed, with costs.

The other learned Judges concurred.

Judgment accordingly.

STAFFORDSHIRE ASSIZES—NISI PRIUS COURT.

MONDAY, JAN. 26.

(*Before Justice* MANISTY *and a Special Jury.*)

HIPKINS *v.* CORPORATION OF BIRMINGHAM.

CONTAMINATION OF A WELL AT WEST BROMWICH.

This was an action brought by Charles Hipkins, the owner of two houses in Jervoise Street, in the parish of West Bromwich, against the Birmingham Corporation, to recover certain penalties, to which he alleged he was entitled under the 160th and 161st sections of the Birmingham and Staffordshire Gas Act, 1845, by reason of the defendants having permitted water to escape from a gasholder-tank belonging to them, and to pollute the plaintiff's well. The plaintiff sued for a penalty of £200, and for a penalty of £20 a day for each day that the pollution continued—in all 36 days—making together £920.

Mr. JELF and Mr. HATTON appeared for the plaintiff; and Mr. MATTHEWS, Q.C., and Mr. ANSTIE for the defendants.

Mr. JELF, in opening the case, said the plaintiff, who was the owner of two houses in Jervoise Street, West Bromwich, brought this action to recover certain penalties in consequence of the pollution of a well on his premises, resulting from the acts of the defendants in making gas and allowing certain water to escape from a tank on their premises. The plaintiff did not mean to say that he had actually sustained damage to the extent of the penalties named. What he did say was, that the defendants, who were a wealthy corporation, had purchased a certain undertaking, with the rights and the liabilities attaching to it, and that the Act of Parliament under which they had obtained the undertaking had provided regulations by which in certain events they were to pay penalties, the object being to prevent the occurrence of injury to persons property from the operation of the works. Inasmuch as the defendants had brought themselves within the meaning of the words of the statute, they were liable to the plaintiff to the extent of the penalties claimed. The damages actually sustained by the plaintiff were not inconsiderable, because in 1867 he bought the land on which the houses were built, and sank the well at considerable expense, and the water being once contaminated by water from the gas-works, the products therefrom were of such a subtle character that they insinated themselves into the ground, and would continue to pollute the water for a long time to come. He then referred to the Act of Parliament by which the Birmingham and Staffordshire Company's gas-works were transferred to the Birmingham Corporation, which Act he said provided that they should take over the undertaking, with all its rights and liabilities, and it substantially placed the Corporation in the same position as that occupied by the Staffordshire Company. He explained that the 160th section of the Act 8 & 9 Vict., c. 66, which was an Act to enlarge the powers of the Birmingham and Staffordshire Gaslight Company, enacted that "if the Company shall at any time cause or suffer to be conveyed or to flow into any stream, reservoir, aqueduct, pond, or place for water within the limits of this Act, or into any drain, sewer, or ditch communicating therewith, any washing, substance, or thing which shall be produced in making or supplying gas, or shall do any act to the water contained in any such stream, reservoir, aqueduct, pond, or place for water, whereby the water therein shall be fouled or corrupted, then the Company shall forfeit for every such offence the sum of £200." There was also subsequent statute with reference to pollution by gas-works products. He next referred to a similar action brought by a brother of the present plaintiff against the Staffordshire Company before the works were transferred to the Birmingham Corporation. In that case he said it was contended that the defendants were not liable unless there was some negligence on their part, and that the injury did not result from their acts, but from mining operations. The majority of the judges in the case were of opinion, however, that negligence was not a necessary element, and that the defendants were liable totally irrespective of personal fault. After reading the decisions of the judges, he said it was perfectly clear that the Staffordshire Gas Company were liable; and he pointed out that for every day the pollution was continued, after notice had been given of the fact of the injury, the defendants were liable to a penalty of £20 a day. If the Staffordshire Company would thus have been liable, it would be for his friend (Mr. Matthews) to show how it was that the defendants were not also liable under the present circumstances. The facts of the case were that on the 9th of May last the water in the plaintiff's well was found to be impure and unfit for use, and the same day a sudden depression took place in the gasholder-tank, and there was no doubt that a collapse occurred in the bottom of the tank. The water, impregnated with gas, escaped, and in that way the well was polluted. The pollution went on, as was admitted by the Corporation, until the 10th of June, 27 days after notice was given, and there were also subsequent days on which the pollution continued.

Mr. *Charles Hipkins*, the plaintiff, was examined, and deposed to the facts stated by the learned Counsel. He said his houses were on the opposite side of the road to the defendants gasholder. The Corporation pumped all the water out of the well by the 10th of June, and it was dry until the 1st of July, when water came again. His well was still polluted, but not so badly. On the 18th of August the water came again, and was even then polluted.

Mr. MATTHEWS contended that the plaintiff must show a continuous flow of water from the gas-works to the plaintiff's well, in order to make the defendants liable after the 10th of June, up to which date they admitted the well was polluted. Proceeding with the cross-examination of the witness, he asked if he had received, through his Solicitor, the following letter from the Town Clerk, dated Oct. 28, 1879:—

Dear Sirs,—*Hipkins v. Corporation.*—While the Corporation will resist to the uttermost any attempt on the part of the plaintiff to extort money from them in the shape of informer's penalties in respect of an accident caused by no negligence on their part, and by which they have been the greatest sufferers, they are most anxious to do him ample justice if he has really sustained any injury.

The matter has been carefully considered during the vacation, and now without admitting any liability whatever on the part of the Corporation, I am instructed to make the following offer:—(1) To pay the cost of laying on the water of the South Staffordshire Water-Works Company to the plaintiff's premises. (2) To pay the plaintiff in cash, or give him a security on the Corporation rates for a sum sufficient to produce, at 25 years purchase, the annual water-rate which he would have to pay to the Company. (3) To pay your client's costs.

After conferring with your client, I shall be glad to hear from you on the subject.

(Signed) E. J. HAYES, Town Clerk.

Witness said he had not heard of the letter before.

Justice MANISTY thought that the letter appeared to open the door for the plaintiff to make a liberal arrangement with the defendants, and he suggested the advisability of his conferring with his Solicitors on the matter. He thought that the Corporation seemed to be anxious to do something liberal.

A conference took place as suggested, and during this the following letter from plaintiff's Solicitors, which was received in reply to the above, was read:—

Sir,—We object to your insinuation that the plaintiff is attempting to "extort money in the shape of informer's penalties." It is plain he is no informer. He seeks to recover compensation for the injuries you have done him in the way provided by law, and, although we are sorry that you have been unfortunate, we have no doubt you will be amply compensated by the profitable results of the undertaking.

With regard to your proposal, our client has an objection to use South Staffordshire Company's water on any terms, and therefore we can have no hesitation in declining it.

You will have to give us a substantial sum of money, or else fight the question, and personally we are happy either way; but we esteem, as you must do, the value of peace and quietness, and whenever you are disposed to talk reasonably with us, we shall be happy to settle the matter. But you must sink altogether the power and wealth of your Corporation, and remember there is law and justice to be had by the poorest suitor.

We are quite prepared to meet you, and to do all that is right and reasonable.

(Signed) DUIGNAN AND CO.

After the consultation,

Mr. MATTHEWS intimated that no arrangement had been come to, and he proceeded with the cross-examination of the witness, who admitted that the property, the value of which he estimated at £900, was mortgaged. His houses had not been injured by mining operations.

Mr. JELF said the plaintiff had clearly forgotten the communication which was received by his Solicitors, for he had had two interviews with the Town Clerk of Birmingham on the matter.

Mr. MATTHEWS then submitted a number of objections. In the first place, he said, there should have been a notice of action, under the Municipal Corporations Act. The Birmingham Gas Act gave the Corporation no power to act as a body, but everything they did was by virtue of their being a Corporation under the Municipal Corporations Act. His second point was that the water polluted was not the plaintiff's water, by reason of the mortgage. And he objected, thirdly, that evidence had not been given that defendants had "caused or suffered" the water from the gasholder-tank to be conveyed into plaintiff's well. He further contended that it was necessary for his friend (Mr. Jelf) to show that the cause of the pollution was not the act of a third person, by mining operations. He did not want in the least to withdraw from the admission made by the Town Clerk that washings had flowed into the well, and for the £200 penalty his point would not arise; but as to the second group of penalties which supposed a continuing to flow, he submitted that there was no evidence of any water flowing into the well after the first break of the tank, and defendant must give evidence of it before he could recover the second bunch of penalties.

Mr. JELF having briefly replied,

Justice MANISTY decided that the matter must go to the jury.

Mr. MATTHEWS then addressed the jury for the defence. He commented on the fact that the Corporation had already made plaintiff a liberal offer, which was contained in the letter that had been read. Mr. Hipkins was not contented with this, and said he would have his "pound of flesh." He (Mr. Matthews) pointed out that the real cause of the injury was the mining operations which were carried on in the neighbourhood. The Corporation were unable to find solid land anywhere in the locality on which to put the tank, and they were bound by Act of Parliament to supply gas, and they could not do so without a holder. The jury would therefore see the difficult position in which they were placed. He reminded them that the plaintiff was not the only inhabitant of Jervoise Street. He had merely been put into the front of the battle, and there would be other houses to which the Corporation might be liable if they were to be held responsible for all the penalties claimed in this case. The accident to the tank was caused by mining operations, and he would try and satisfy them that there had been no negligence whatever on the part of the defendants, but rather that the utmost care was used by the Gas Committee, and that they went to great expense to prevent any accident of the sort. As to the penalties alluded to, he submitted that no water continued to flow after defendants commenced pumping, and that if the penalties were to be paid it would be because they had used their energies to try and remedy the mischief caused. He, in conclusion, asked whether it was possible for the defendants to stop the foul water from flowing any sooner than they did, and he urged that they had pumped as hard as they could until they made the place dry.

Mr. *Hugh Young*, a Gas Engineer, deposed that he superintended the construction of the gasholder. The tank cracked across the bottom in 1858, and he attributed it to the working of neighbouring mines. He described the means that were taken for the repair of the damage; and stated that the tank continued perfectly sound from then up to the time referred to in the action.

Mr. *Henry Hack*, Engineer at the Saltley gas-works of the Corporation, said that up to the time when the accident occurred no leakage had been discovered from the tank in question. As soon as the leakage commenced, pumping was begun, and it was continued until the tank was empty on the 10th of June. No more gas had been stored in the tank since that time, and if any mischief had since ensued it had been through gas products being in the soil. The gas was blown out on the 27th of May. The utmost diligence and skill had been used to remedy the results of the accident to the tank.

In reply to Mr. JELF, witness said the Corporation had since abandoned the defective tank.

By Mr. MATTHEWS: He was not conscious of anything having been done to the tank since, that had caused a flow of gas and water to the well.

TUESDAY, JAN. 27.

Mr. MATTHEWS said that he would not have to trouble the Court further, a compromise having been come to.

Mr. JELF said this was the case, the defendants having behaved very liberally—consenting to pay £200 and costs—judgment, however, to be entered for them.

YORKSHIRE WINTER ASSIZES—WEST RIDING DIVISION.

LEEDS, FRIDAY, JANUARY 30.

(*Before Justice* HAWKINS.)

THE RECENT EXPLOSION AT THE BRADFORD CORPORATION GAS-WORKS.

The charge of manslaughter arising out of the explosion which occurred at the Bradford Corporation Gas-Works on the 22nd of November last, was in the Crown List for trial at these Assizes.

Justice HAWKINS, in his address to the grand jury, alluded to the case. He said that, among others, there was a charge against a man named Samuel Ryder for the manslaughter of William Holt, at Bradford, but it had only come before him on the Coroner's depositions, and he did not know whether the prisoner had been before the Magistrates. It was very desirable, if a man was to be indicted for such an offence as this, that the case should be investigated before the Magistrates as well as before the Coroner, in order that he might be put on his defence. The facts of the case were that the prisoner was in the employment of the Bradford Corporation, at their gas-works in Thornton Road. On the 22nd of November, early in the morning, there was an explosion at the works, with the result that a man named Holt was killed. Previous to the explosion the prisoner had noticed that there was an escape of gas in the purifying-house, as undoubtedly there was, at the rate of about 5000 feet per hour. The prisoner had been forbidden by his employers to enter the purifying-house, particularly if he had a lantern; but he had either forgotten his instructions or disregarded them, for, in order to see what was the cause of the escape of gas, he entered the purifying-house with a lantern, the consequence being the explosion. The prisoner's lantern was found in the purifying-house, and also his hat. This was one of those cases in which it was quite certain that no harm had been intended to anybody. The prisoner was doing

the best he could, as he thought. He was acting unquestionably in disobedience to his employers instructions, but it did not follow that disobedience to the orders of a master was to constitute a case of culpable negligence against a man, so as to make him responsible for the death of another fellow-creature. The grand jury would ask themselves whether, under all the circumstances, the prisoner was guilty of such culpable criminal negligence in the matter that they ought to return a true bill for manslaughter.

Subsequently, the Grand Jury having returned a true bill,

Samuel Ryder surrendered to his bail on a charge of the manslaughter of William Holt at Bradford, on Nov. 22, 1879. He pleaded "Not guilty."

Mr. SLINGSBY, who appeared for the prosecution, said he did not intend to offer any evidence, whereupon

Justice HAWKINS, addressing the jury, said that this was a most unfortunate case. It seemed there was on the day named in the indictment an escape of gas at the Bradford Corporation Gas-Works, and that the prisoner, no doubt with the intention of remedying it, went into the purifying-house with a light. Unfortunately, an explosion took place, and in it the man Holt was killed. The prisoner also sustained serious injuries. The Coroner's jury, on inquiring into the death of Holt, came to the conclusion that his act amounted to one of manslaughter, and he was committed upon the Coroner's warrant. The matter was subsequently before the Magistrates, who came to the determination that there were no grounds for committing him; and now the Counsel for the prosecution had informed the Court that he would not offer any evidence in the matter. This was very proper; because it would not be sufficient to convict the prisoner of manslaughter to prove that he simply imprudently went into a place where there might be an escape of gas, but they would have to show that he went in there most recklessly, criminally, and grossly negligent in the discharge of his duties. There was no evidence that the prisoner did this, so they would, of course, find him not guilty, and he would be discharged.

The jury then formally tendered a verdict of "Not guilty," and the accused was liberated.

LISKEARD COUNTY COURT.—MONDAY, JAN. 19.

(*Before Mr.* M. BERE, Q.C., *Judge.*)

THE SUPPLY OF WATER TO LISKEARD WORKHOUSE.

At the December sitting of the Court, an action was heard of *The Liskeard Water-Works Company v. The Board of Guardians of Liskeard Union;* and to-day judgment was delivered. The proceedings were nominally taken to recover three-quarters of a year's rent for water supplied by the plaintiffs, who are incorporated under a private Act, and who claim to be entitled to charge the Guardians at a special rate of £40 per annum, on the ground, among others, that the water supplied to the workhouse is not supplied for domestic purposes. The Guardians paid £11 into court, contending that the water used was for domestic purposes. The plaintiffs held, on the other hand, that it was for public purposes, and could only be obtained on special agreement between the parties. Negotiations having been unsuccessful, the action had been brought to settle the matter.

Mr. CHILDS appeared for the plaintiffs; and Mr. SHELLEY for the defendants.

Mr. BERE, in giving judgment, said: This is an action brought to recover three-quarters of a year's rent to Michaelmas last, for water supplied by the plaintiffs, who are incorporated by a special Act of Parliament, to the workhouse of the Liskeard Union. I will first dispose of the amount claimed, which is alleged to be due as being the sum which, at the rate of £40 a year, the Directors of the Company contend they have, under their Act, a right to charge the workhouse with, on the ground, among others, that the water supplied to the workhouse is not used for domestic purposes within the meaning of the Company's private Act, or of the Water-Works Clauses Act, 10 Vict., c. 17, which is incorporated therewith. I am of opinion that the claim of the plaintiffs, so far as the amount is concerned, cannot be supported, inasmuch as the powers given by their Act are confined to agreements between plaintiffs and public corporations desirous of having such supply of water. The demand that was made in Mr. Childs's letters of Aug. 20, and Dec. 21, 1878, and not agreed to by the defendants—but, on the contrary, declined by them—can hardly be an agreement between plaintiffs and defendants, which only will satisfy the clause in the Company's Act, under which they sue. The plaintiffs are, however, entitled to some payment, as the defendants have not paid anything for water since Christmas, 1878. What amount they are to be paid is, therefore, the question; but before determining that point, I will shortly deal with the arguments which were used to show that the defendants had brought themselves within the 35th section of the Company's Act—because their use of the water was for other than domestic purposes. The 34th section of the Company's private Act defines what are not domestic purposes, and using the words "for further purposes," raised the contention that any water used in the workhouse was used for public purposes, because the workhouse was a public place. This contention appears to me a very far-strained one, and I am of opinion that the words "for public purposes," do not apply to the place where the water is used, but the purposes for which it is used, such purposes being hinted at, at any rate, in the 34th section of the Water-Works Clauses Act, and are for the cleansing of sewers and drains, cleansing and watering the streets, and supplying any public pumps, baths, or washhouses. A fountain open to the public, but restricted in use, is not a supply for public purposes. Further, I am of opinion that a workhouse is not a public place. In the case of *Regina v. Wallingham Union*, a workhouse was held to be rateable, inasmuch as it was not devoted to public purposes, and was beneficially occupied. In the case *Marks v. Benjamin*, the word public received judicial interpretation. A place was public to which all persons had a right to go, whether gratuitously or for payment. The workhouse certainly will not receive any one who knocks at the door, even if he offers to pay for his bed. Another objection was taken under the 33rd section of the Company's Act, which shows who the persons are who are alone to be supplied with water, under the Act, for domestic purposes—namely, "the owner or occupier of any house." It was contended that such house must be a dwelling-house; and that, though the Guardians might be occupiers, yet they could not be called dwellers. The word "dwell" has, however, also received judicial interpretation; a railway company dwells at its principal station, a gas company where it carries on its business, a pier company where its registered offices are. I therefore come to the conclusion that the defendants are occupiers of the house in which they dwell, and are a corporation who may demand water from the plaintiffs. Now, as to the amount they are to pay, it appears that ever since 1862, under some agreement or other, the sum of £25 has been paid by the defendants to the plaintiffs, and although no record of this agreement exists, I must assume that as between the contracting parties all things were duly done to make such agreement binding, and that it is binding. The defendants have paid money into court calculated on the scale of prices put forth by plaintiffs, in which a house of £100 is charged at the rate of 3½ per cent. The scale is a descending one from 5½ per cent. to 3½, but I do not think that the plaintiffs are pledged to this scale, and therefore but for the agreement they might charge at the rate of 6 per cent. on the rateable value of the workhouse, in accordance with which I give judgment for £18 for the three quarters due at Michaelmas, 1879.

It was pointed out that the rent had always been paid in advance, and that such was the Company's rule.

Mr. BERE therefore altered his judgment to £25.

Judgment for plaintiffs accordingly.

WORSHIP STREET POLICE COURT.—TUESDAY, JAN. 27.

(*Before Mr.* HANNAY.)

THE EAST LONDON WATER-WORKS COMPANY AGAIN CONVICTED.

The East London Water-Works Company were summoned by Alfred King for having neglected to furnish him with water, he being an owner of a house, and entitled to receive a supply during the time the rates for such supply had been paid.

Mr. LEWIS appeared for the complainant; and Mr. WRAGG for the defendants.

Mr. LEWIS, in opening the case, said that the Company had kept his client, on some buildings he had erected in Bethnal Green, without water for nearly six weeks, although notice had been given and the necessary deposit paid. The Company had, he understood, some idea, which he thought foolish, of their rights, and so refused. He then called attention to the regulations for supplying water by the Company, and the section of the Act of Parliament imposing a penalty of £10 for refusal.

Mr. WRAGG said that the objection taken on the part of the Company had regard to the fittings. By their regulations, the Company had a right to refuse to supply water until the water-closets and water-supply apparatus were fitted with an efficient waste preventer, so that no more than 2 gallons of water should be supplied at one flushing. On the premises in question an apparatus which the Company's Engineer could not approve of had been fixed, and hence the refusal.

Evidence was then given by the plumber employed on the building, as to the fixing of a patent anti-waste water apparatus, and as to the efficiency of the same in complying with the regulation for preventing a flow of more than 2 gallons at one flushing.

Mr. *Alfred Tylor* was called, and explained the action of the apparatus. In reply to Mr. LEWIS, he stated that at one time the Water Companies sought to have specified in their Acts the apparatus that should be used. A Parliamentary Committee was, however, appointed on the matter, and it was shown that it would cost over £4,000,000 to supply London houses under such a regulation. He was examined on the Committee, and in the end the regulation stood that an efficient waste preventer should be fitted. The waste preventer he had patented was in use by most of the large Water Companies, and was not liable easily to get out of order.

John Topp, a foreman in the employ of the New River Company; Mr. *Walker*, Sub-manager of the Reading Corporation Water-Works; *George Davis*, a foreman plumber to a builder, and several other witnesses gave evidence as to fixing the apparatus in question, and as to its complying with the regulations.

Mr. WRAGG, in cross-examining some of the witnesses, showed that the apparatus was fixed under the seat of a water-closet, and was worked at the same moment with the ordinary valve. In addressing the Magistrate, he said that the Company's Engineer objected to this mode of employing a waste preventer, and claimed that the Company had a right to say what apparatus should be employed.

Mr. LEWIS pointed out that there was nothing in the regulations of the Company which gave them any such power, or in any way prescribed how the apparatus should be fixed.

Mr. *Clayton*, of Westminster Chambers, and Mr. *Seaton*, Engineer to the Company, gave evidence that they did not think the apparatus efficient.

Mr. LEWIS put in a letter signed by Mr. Seaton, in which water service was refused because the apparatus was fixed under the seat, "which," the letter said, "the Company did not allow under any conditions whatever."

Mr. HANNAY, in giving judgment, said that he could only come to the conclusion that it was an afterthought by the Company to say that the apparatus was not efficient, and the letter of the Engineer bore that out. The regulations, however, gave the Company no power to say that the apparatus should not be fixed under a closet seat. If they thought they had that right, they could themselves have raised the question by summons before the Court. They had first taken up an untenable ground, and the new position, that the apparatus was not efficient, was not supported by evidence. He imposed a penalty of £5, and ordered the Company to pay £10 10s. costs.

A second summons in which the Company were complained of, on other grounds it was understood, was adjourned by consent for a fortnight.

Miscellaneous News.

METROPOLIS WATER SUPPLY.

The following are the returns of the Society of Medical Officers of Health on the Composition and Quality of the Metropolitan Waters in January, 1880:—

NAMES OF WATER COMPANIES.	Total Solid Matter per Gallon.	Oxygen required by Organic Matter, &c.	Nitrogen. As Nitrates, &c.	Ammonia. Saline.	Ammonia. Organic.	Hardness (Clark's Scale). Before Boiling.	Hardness (Clark's Scale). After Boiling.
Thames Water Companies.	Grs.	Grs.	Grs.	Grs.	Grs.	Degs.	Degs.
Grand Junction	21·45	0·048	0·158	0·001	0·008	15·8	3·6
West Middlesex	22·20	0·081	0·158	0·0015	0·008	16·2	3·8
Southwark and Vauxhall	22·45	0·066	0·165	0·000	0·009	16·0	3·6
Chelsea	21·40	0·022	0·150	0·0005	0·008	15·8	3·6
Lambeth	21·20	0·043	0·167	0·001	0·010	15·6	3·3
Other Companies.							
Kent	33·10	0·007	0·435	0·000	0·002	21·2	6·0
New River	22·85	0·024	0·185	0·000	0·008	16·0	3·2
East London	24·10	0·026	0·183	0·0015	0·009	16·5	3·8

Note.—The amount of oxygen required to oxidize the organic matter, nitrites, &c., is determined by a standard solution of permanganate of potash acting for three hours.

The water was found to be clear and nearly colourless in all cases but the following, when it was very slightly turbid—namely, Lambeth and West Middlesex.

C. MEYMOTT TIDY, M.B.

REDUCTION IN THE PRICE OF GAS AT MATLOCK BRIDGE.—A reduction in the price of gas at Matlock Bridge is announced of 5d. per 1000 feet, with 10 per cent. discount if accounts be paid within 14 days of becoming due.

HOLMFIRTH GAS COMPANY.—The annual meeting of this Company was held on Wednesday last—Mr. B. Butterworth presiding—when a dividend at the rate of 5 per cent. per annum was declared.

PARA GAS COMPANY, LIMITED.

The Ordinary General Meeting of this Company was held at the London Offices, 7, Union Court, Old Broad Street, on Thursday, the 29th ult. —James Brickwell, Esq., in the chair.

The Secretary (Mr. T. S. Borradaile) read the notice convening the meeting, and the following report and statements of account were presented:—

The Directors have again the pleasure to submit to the Shareholders the usual half-yearly statement of accounts and balance-sheet, which now show the position of the Company's affairs up to the close of the financial year ending Sept. 30, 1879.

The net profits for the six months amounted to £5204 3s. 8d.—a larger amount than has been reached for many years. This result has been obtained partly by reduction of working expenses, and partly by increased business. In comparing the figures with those of the former year, it will be observed that the revenue from private lighting and residual products has been augmented.

In the previous half year it was deemed prudent to provide for a probable loss in exchange in remittances to this country. This was done to the extent of £250. Your Directors are glad to say that, owing to a rise in exchange, this amount proved to be in excess of the requirements, and consequently the result shows a balance in favour of this account amounting to £145 16s. 8d. for the half year.

The general trade of the province of Pará appears to be improving, and the recent advance in the price of rubber and other products cannot fail to have an influence, direct or indirect, to the advantage of this Company.

At the time the present Board accepted office there existed a debenture loan of £10,000, raised at 10 per cent. The loan and interest thereon has been reduced from time to time, there now remaining only £2100 to liquidate. It is the intention of your Directors to retire the balance of this loan when it matures in February next. Although these debentures have lately only carried 5 per cent. interest, it is considered a matter of congratulation to the Proprietors that the improved condition of the Company's affairs allows of the account being closed.

The sum of £200 has been appropriated from the available revenue of the Company to the reduction of the amount standing to the debit of lighter capital account.

With the balance brought forward from the previous half year (after payment of the August dividend), £652 6s., the available amount for division (reduction of lighter capital, bad and doubtful debts, and loss for unserviceable meters being provided for) is £5592 6s. 8d., and from this the Directors now recommend a dividend at the rate of 6 per cent. per annum for the half year just closed, payable on and after Feb. 19, 1880. This, together with the interim dividend paid in August last (in accordance with the powers vested in the Directors) at the rate of 4 per cent. per annum, will make a total dividend of 5 per cent. for the twelve months ending Sept. 30, 1879, leaving £586 4s. 8d. to carry forward.

Advices received from the Manager (Mr. G. H. Sumner) continue to be very satisfactory, and he reports that the works of the Company are maintained in a very efficient condition.

Two of your Directors, Mr. Louis Penny and Mr. Thomas Clarke Tatham, retire by rotation, but are eligible for re-election, and offer themselves accordingly.

Mr. Philip Crellin, the Auditor of the Company, likewise retires from office; but, being eligible, also offers himself for re-election.

General Balance-Sheet, Sept. 30, 1879.

Dr.				Cr.			
Authorized capital		£175,000	0 0	Works, including extensions, furniture, &c.		£142,985	2 3
Less not taken up		8,130	0 0	Gas-fitting capital on March 31, 1879		11,458	6 5
		£166,870	0 0	Extensions to date		129	16 6
Debenture loan		2,100	0 0	Value of stock in Pará		3,040	17 3
Fire insurance-fund		1,087	6 8	Lighter capital £1,732 14 11			
Bills payable		372	7 1	Less written off 200 0 0			
Sundry creditors in London		375	18 3			1,532	14 11
Ditto in Pará		552	2 6	Stores		1,693	3 1
Gas-fitting rental reserve-fund to March 31, 1879 £900 7 7				Coals		2,757	17 5
Add reserve for the current half year, less expended in repairs	110 19 9			Wood		13	2 9
		1,011	7 4	Mauá and Co. (in suspense)		112	14 9
Profit and loss		5,592	6 8	Sundry debtors in Pará		3,275	1 5
				Cash at Pará bankers		7,671	13 11
				Ditto Glyn and Co.		974	17 5
				Petty cash (London)		9	0 4
				Bills of exchange, in hand		2,307	0 1
		£177,961	8 6			£177,961	8 6

Revenue Account, for the Half Year ending Sept. 30, 1879.

Coal and wood for carbonizing		£3,135	16 11	Public lamps		£5,828	3 4
Wages, includ. lamplighting, purification, & carbonizing		1,916	0 2	Private lights		3,595	17 6
Salaries		778	3 4	Public establishments		388	17 8
Sundry charges		55	0 0	Illuminations		162	11 7
Retorts		87	2 1	Fittings-rental		121	14 11
Repairs		131	3 4	Meter-rental		212	4 8
Office expenses, stationery, printing, &c.		101	0 10	Lighter revenue		224	6 9
Law charges		2	16 6	Coke		1,139	10 4
Gas-fitting revenue and expenditure		198	6 6	Tar		149	15 6
Interest and discount		29	1 11	Exchange		145	16 8
Debenture interest		52	10 0	Transfer fees		2	17 6
Directors fees		300	0 0	Rent and taxes		53	5 8
Travelling expenses		33	18 10				
Profit and loss		5,204	3 8				
		£12,025	4 1			£12,025	4 1

Profit and Loss Account.

Dividend paid July, 1879		£3,337	8 0	Balance brought forward from March 31		£3,989	14 0
Bad debts to this date	£62 1 9			Revenue account (profit)		5,204	3 8
Less recovered in the half year	45 16 8						
		36	5 1				
Less amount written off for unserviceable meters		27	17 11				
Ditto, in reduction of lighter capital		200	0 0				
Balance carried forward		5,592	6 8				
		£9,193	17 8			£9,193	17 8

The Chairman: Previous to placing before you the resolution for the adoption of the report and accounts, I will make a few remarks with respect to our year's operations. In the first place, I think we may strongly congratulate ourselves—I am sure that is the feeling of the Board—as to the satisfactory condition in which all our affairs are at present; also on the fact that for some time past they have been progressing towards this condition. In reading the report, you cannot have failed to notice that considerable improvement has taken place since the Board last had the pleasure of meeting you. I will just briefly refer to the items in the report, one of the first being with respect to the advantage we are now deriving from the favourable alteration in the rate of exchange. Only a day or two ago, when our last remittance arrived, we obtained a rate of 23½d. That was against 19d., the lowest rate; and it was at this low rate we debited our accounts with a considerable sum. I am glad to say this was in excess of our actual requirements. So much the better for the year's accounts. As to the paragraph referring to our debenture loan, I think that is a matter for considerable congratulation, because I hope in a few days, or, at all events, in the course of the ensuing month, we shall be able to liquidate the whole of the debt—I call it a debt—of which now only £2100 is outstanding. This amount will fall due about the middle of February, and we propose not to renew it, but to pay it off at the period of which the holders will have due notice. I may say that our general working during the past year has been highly successful; but we have also been much assisted by the continuation of favourable prices for coal, and the freights have been equally in our favour. Our carbonizing operations have been very satisfactory, and we have derived considerable advantage from the improvements in working, and other changes, in having been able to reduce our unaccounted-for gas to a very small amount, particularly for a district situated like the one in which our operations are carried on. Our unaccounted-for gas, which you may term leakage, is now reduced to about 8·6 per cent., which really is very low—only, in fact, a trifle higher than that of the best-managed Metropolitan Companies. It is gratifying to see that our gas supply has been very good, inasmuch as we have manufactured over 500,000 more feet of gas this year than we did in the year 1878. In money it amounts to an excess of £447. Our coke also, which has been such a drug to us, has shown some improvement, though not so much as we could have wished. The price does not vary to any very great extent, but the receipts have increased by £112. On another product—tar—which had been almost useless, we have received an excess of £79 18s.—roughly £80—as compared with the amount received in the former year, and this, considering the great disadvantage we labour under in regard to residual products, is not, I think, an unfavourable return. It may be a sort of condensation of the items I have just given you, and it may be satisfactory to you to hear that for each ton of coal we have had something like a receipt of £6 5s. 11d. That is averaging the product of each ton of coal for the twelve months. I may make a remark in reference to the reserve-fund. I think you will see that, although we have no reserve-fund, we have from time to time been making up some little arrears, which is something similar; that is to say, we have this last year written off £200 on account of the lighter capital, of which nothing has hitherto been written off. Although the lighters even now are all in very good condition—indeed, almost equal to new—we think it quite right that periodical reductions should be made in the account. I think you were informed at the last meeting that we had written off a considerable sum on account of meters. That is another item for which, if not neglected, it has not been convenient to set apart any amount—this meter depreciation; and that will now be continued similar to the practice of gas companies in England. As most of you are perhaps well aware, there is considerable depreciation in meters—so much so, that most of the Metropolitan Companies set apart 10 per cent. for meter depreciation. I am not aware that there is anything else very special for me to refer to, for our report deals pretty fully with most of the matters connected with the working of the Company. I will, therefore, now move—"That the report and accounts of the Directors to the Shareholders, as presented, be and they are hereby approved and adopted."

Mr. T. C. Tatham seconded the motion.

Mr. Alfred Penny said the Directors were to be congratulated on the excellent working of the past twelve months. So far as he was personally concerned, it was very much beyond his expectations and hopes. He felt it was decidedly a matter for congratulation to have arrived at the position indicated by the accounts which had been placed before them on this occasion. He never expected that the Company were going to pay 5 per cent., but it was very satisfactory to find they were not only offering that rate of dividend, but were doing so out of fairly-made profits. As to the debentures they were going to pay off, he should like to know from what fund this was to be done? With regard to the rate of exchange, it was a variable thing, and although they showed a small profit this year, they might find themselves "in the mud" next; so he did not attach very much importance to the rate being in their favour this year. He hoped, however, they would get their money over without sustaining much loss. In one gas company he was connected with—the Bombay—they suffered very greatly by loss on exchange. They had lost there between £6000 and £7000 in the half year, which caused a large diminution in the profit, and he hoped the Pará Gas Company would not be exposed to such a disadvantage. As regarded the working of the undertaking, that was extremely satisfactory. As an expert, he was bound to say that it was most satisfactory to find that their unaccounted-for gas was only 8 per cent., which showed that great care was exercised by those who had the management of the concern on the other side; and, in fact, the whole business of the Company appeared to be conducted in an admirable manner. The Directors must have exercised much care and skill in bringing the Company into the position it now occupied, and the Shareholders fully appreciated what they had done.

The Chairman: In answer to your question as to the loan, our requirements are now very much less than they were some time ago. This arose from the large arrears then due to us from the Government. I do not know how many quarters it was, but I believe we were sometimes for half the twelve months without receiving anything from the Government; but I am happy to say that during the greater part of the last six months they have paid ready money. Almost immediately the amount was due we have had the remittance, and this enables us to work with smaller capital. Therefore, when this £2100 falls due, we shall not require to renew it, and it will be paid off about the middle of next month. We do not require this money, so it is tantamount to having so much less capital. There is no question that it is a very creditable thing indeed for the Brazilian Government to keep such good faith with us, and pay so promptly; and it is also satisfactory to find, from the improvement of our general business, that we are able to do without the money. We have tried from time to time to make the burden as light as possible, by first reducing the amount of £10,000 to £5000, and then by gradually paying off this smaller sum. I should be very sorry to cast any reflection on the former management of the Company, because you must bear in mind that although the rate at which the money was borrowed was as high as 10 per cent., the former Board had many difficulties to contend with, which we have not. Money, too, at that time, may have been very dear, and perhaps they could not borrow money quite so readily as can be done at the present time. I do not wish, therefore, to take upon ourselves all the credit, with the view of making the former management look not so bright. With respect to the remark about the rate of exchange, I will merely say that the loss was much less than in the previous twelve months.

Mr. Alfred Penny said he had only observed that the rate of exchange was exceedingly fluctuating, and that although they now obtained the benefit of a good rate, yet they might find themselves back again to the rate of 19d. Therefore he did not think much importance should be attached to the fact that the rate was now in their favour.

The Chairman: We have given instructions to our Manager that the funds kept in the Brazils shall be as small as possible—that is, that he shall remit the money as soon as convenient after the receipt of it. At present we have some money—perhaps between £2000 and £3000—which I believe he will send over almost immediately, and we hope that we shall not have a lower rate of exchange than at the present time.

Mr. Louis Penny observed that by the Company's contract with the Provincial Government they had the right to receive from them the difference between the par of exchange—27d.—and the current rate. The only occasions on which they could lose by exchange were when accounts were received two or three months after presentation, when exchange had fallen; but, on the other hand, this was compensated for when exchange happened to rise. In effect, the receipts for gas were, in the long run, unaffected by exchange.

Mr. ALFRED PENNY said the Chairman's explanation with regard to paying off the loan was most satisfactory, for if he understood him correctly, money had been borrowed on debentures for working capital, and now that they had brought their funds into proper condition, by receiving payment of over-due accounts, they no longer needed the money, and were enabled to pay it off without putting any burden on the Company.

The CHAIRMAN: Exactly.

Mr. LOUIS PENNY: And out of funds in hand.

The motion was carried unanimously.

The CHAIRMAN then moved—"That the interim dividend paid to the Shareholders at the rate of 4 per cent. per annum for the half year ending March 31 last be and is hereby confirmed, and that a half year's dividend up to the 30th of September last, at the rate of 6 per cent. per annum for the half year just closed, and free of income-tax, be payable to the Shareholders on and after the 18th of February next."

Captain J. W. CLARKE seconded the motion, and it was carried.

The CHAIRMAN then moved, and Mr. F. D. GODWIN seconded, the re-election of Mr. Louis Penny as a Director, and the motion was carried; as was a similar resolution, on the motion of the CHAIRMAN, seconded by Captain CLARKE, for the re-election of Mr. T. C. Tatham.

Captain CLARKE moved, and Mr. E. F. LAMBERT seconded, the re-election of Mr. Philip Crellin as Auditor for the ensuing year, and the motion was agreed to.

Mr. TATHAM then brought forward the question of the proposed alteration in the Articles of Association, and observed that the resolution really required no explanation. The Shareholders had all found the inconvenience of one of the articles as it stood, and the alteration proposed was only a slight one. At present they had to wait an hour for a quorum at their meetings, and then, if one were not present, adjourn for a week, when, if again there was no quorum, they adjourned *sine die*. The Directors therefore proposed to make the following alteration in clause 47 of the Articles:—

> If, within half an hour from the time appointed for the meeting, a quorum is not present, the meeting, if convened upon the requisition of members, shall be dissolved; in any other case, the members then present shall be a meeting, and shall, if the majority of those present (such majority to be ascertained by a show of hands) so desire, proceed to the transaction of the business for which such meeting has been called.

It was unnecessary for him to say anything further to commend the alteration to the favourable consideration of the Shareholders.

Mr. ALFRED PENNY desired to second the motion, as a "punctual and suffering Shareholder." At their last meeting he had to wait an hour, and he thought they could not do better than adopt the resolution, and so remove the inconvenience, for those who took an interest in the Company's business and attended the meetings punctually ought not to suffer for those who did not.

The CHAIRMAN said it was with as much satisfaction to the Board as to the Proprietors generally that they had arranged for this alteration to be made. Mr. Tatham, who was so conversant with legal matters, had looked into the question, and the Board had the greatest confidence that it was in every respect right and legal for them to make the alteration.

The motion was put and carried unanimously.

Mr. TATHAM said it would be necessary to have another meeting to confirm the resolution, and he was afraid the attendance of 20 Shareholders would be necessary.

Mr. ENGLISH then moved—"That the best thanks of the meeting be given to the Chairman and Directors of the Company, for their efficient services in the conduct of the Company's affairs during the past year." The Shareholders must see, from the state of the Company's affairs, that their thanks were due to the Chairman and Directors.

Mr. ALFRED PENNY seconded the motion, stating that in his former remarks he had acknowledged how much they were indebted to the Chairman and Directors for the skill they had displayed in conducting the Company's affairs, and for the very handsome return they had given the Shareholders on this occasion.

The motion having been carried unanimously,

The CHAIRMAN said: I can only, on behalf of myself and colleagues, say we appreciate the kind feelings you have expressed. At all former meetings we have received the greatest kindness and forbearance from you, and I thank you very much for your vote to-day.

General MASON next proposed—"That the best thanks of the meeting be given to the Secretary, Manager, and Officers of the Company, for the satisfactory and able manner in which they have discharged their respective duties."

Mr. ALFRED PENNY said he had intended to move the resolution, but he was equally pleased at having the opportunity of seconding it. He was quite competent to form a judgment on the work done by the officers of gas companies; and certainly all he had seen of the very excellent services rendered by the Secretary of this Company, and the good work done by those on the other side, quite justified him in seconding the vote of thanks proposed, and he hoped that the meeting would most cordially support the resolution.

The CHAIRMAN said he was quite sure the Board could endorse all that had been said of the value of the services of the Secretary and the staff.

The motion was carried unanimously.

The SECRETARY, in acknowledging the vote on behalf of the Manager, the staff, and himself, said it had always been a pleasure for him, in the last ten or twelve years, since he had held the position of Secretary of the Company, to do all he could to satisfy the requirements of the Directors, and to push forward as much as possible the interests of the Shareholders.

The proceedings then terminated.

DEARNE VALLEY WATER BILL.—A meeting of the ratepayers of Darfield was held last Thursday, to consider the propriety of agreeing to, or protesting against the township of Darfield being included in the Dearne Valley water scheme. Mr. Stephen Leal, F.G.S., occupied the chair. The matter was discussed at great length, and eventually a resolution was moved—"That the Sanitary Authority of Darfield be requested to petition the House of Commons to have the township of Darfield expunged from the Dearne Valley Water-Works Bill." An amendment that the Sanitary Authority do not take any steps to oppose the Bill was also moved; but eventually the original motion was carried.

LIMERICK WATER SUPPLY.—At the meeting of the Limerick Corporation last Tuesday—the Mayor (Mr. Michael O'Gorman) presiding—the award of the Umpire in reference to the city water supply was read. It determined that the water which the Water Company were able and willing to lay on was not proper, nor was it sufficient; that the purposes for which the water was required by the Corporation were reasonable; that no question arose, or could arise as to the "terms of supply;" and that the Sanitary Authority and the Company should each bear their own costs of the reference, and the costs consequent upon the reference, with the exception of the costs of the award, which should be paid by the Company. The award was, on the motion of Dr. O'Sullivan, seconded by Mr. Bernal, referred to the Water Committee for consideration.

READING GAS SUPPLY.

A Special Meeting of the Reading Town Council was held last Friday—the MAYOR (Mr. H. B. Blandy) presiding—for the purpose of considering a report from the Committee of the whole Council, as to their meetings in reference to the Bill about to be introduced into Parliament by the Reading Gas Company for extending their capital and premises, &c.

The report stated that the Council met in committee on the 14th ult., in accordance with the resolution of the Council at the previous meeting, and considered the report of the Public Lights and Gas Committee (then presented) as to the proposed new Act of the Reading Gas Company. The Committee, having discussed at length the matters referred to in the report, appointed a Sub-Committee, consisting of Aldermen Hewett and Andrewes, and Messrs. King, Hill, Blackall, Simonds, and Monck, to confer with the Directors of the Gas Company upon the Bill, and especially as to the proposed increase of capital, the prescribed maximum prices, and the illuminating power of the gas; and the Sub-Committee were empowered to engage such professional assistance as they might deem expedient.

The report then stated that the Council again met as a Committee on the 22nd ult. The Sub-Committee reported that they had considered the report of the Public Lights and Gas Committee which was referred to them for consideration, and particularly the following points relative to the proposed new Act of the Reading Gas Company, viz.—1. The powers proposed to be obtained by the Company for raising additional capital to the amount of £150,000, exclusive of any premiums which might be obtained on the sale of new shares. 2. The maximum rates of charge for gas supplied by the Company. 3. The illuminating power of 14 candles proposed by the Bill. The Sub-Committee had also conferred with the Directors of the Company, and discussed very fully the several questions above referred to. The final result of the conference was embodied in a letter addressed by the Secretary of the Company (Mr. Robert Bradley) to the Town Clerk, which said that without prejudice, and on the understanding that the arrangements previously entered into on other matters, as mentioned in the report made by the Public Lights Committee to the Council on the 8th inst., would be carried out, and that no fresh questions were to be raised or new demands made, the Directors were willing to make the concessions on the 1st and 2nd of the questions raised as follows, viz.—1. Limit of capital. That the amount of new capital to be raised be £100,000 in cash, including additional borrowed money and premiums on shares, the details of same to be hereafter arranged. 2. Prices of gas within the borough:—

	Price per 1000 Cubic Feet, Act of 1870.	Price to be inserted in Company's Bill.
	s. d.	s. d.
To consumers of less than 20,000 cubic feet half yearly	4 6	4 3
Do. 20,000 and less than 40,000 half yearly	4 3	4 0
Do. 40,000 or upwards, half yearly	4 0	3 9
Gas supplied to public lamps	3 6	3 5

3. Illuminating power of gas to be 14 candles, tested by Sugg's burner as prescribed in the Bill.

Having regard to all the circumstances, the Sub-Committee thought that the terms which the Company were willing to accede to might be accepted by the Council, especially as the Bill would contain a provision limiting the amount of new capital to be raised in any one year, agreeably with a proposal made by the Sub-Committee. If the Council accepted the terms, it would be unnecessary for them, the report proceeded, to take any action with a view to formally opposing the Company's Bill; but care must be taken to ensure that full effect was given to the arrangements made with the Company. Those arrangements were briefly as follows:—(*a*) The arrangements referred to in the report of the Public Lights and Gas Committee relating to the extinguishment of the rights of way possessed by the Sanitary Authority over the lands of Messrs. Huntley and Palmer and Mr. W. I. Palmer; as well as the acquisition by the Sanitary Authority of the right to use the proposed new road and the proposed bridge over the River Kennet, and the acquisition by the Sanitary Authority of a piece of land adjoining the sewage pumping-station, which has been scheduled by the Company for the purposes of the Bill. (*b*) The substitution of the proposed new standard burner for that now in use for testing the illuminating power of the gas. (*c*) The appointment of the Municipal Buildings as the place for testing the gas. (*d*) The above-mentioned arrangements with regard to the additional capital of the Company, the maximum charges for gas within the borough, and the illuminating power of the gas. (*e*) The preservation intact (with the variations provided for in the present arrangements) of the provisions contained in the Reading Gas Acts, 1862 and 1870, for the protection of the public and the gas consumers. (*f*) The due protection of the public interests in regard to the sewers, the water power at Blake's Lock, and other similar matters. (*g*) The incorporation of the Gas-Works Clauses Act, 1871, in the new Act, and the immediate applicability of that Act to the undertaking of the Company, but so as not to interfere prejudicially with these arrangements between the Company and the Corporation.

The report concluded by stating that the Committee having considered the report, it was moved by Alderman Hewett, and seconded by Alderman Andrewes—"That the Committee do recommend to the Council that the proposed arrangements with reference to the Bill of the Gas Company, referred to in the report of the Sub-Committee, be agreed to, and that the Town Clerk be empowered to arrange that Messrs. Sherwood and Co., the Parliamentary Agents for the Bill, shall prepare the alterations and amendments in the Bill necessary for carrying out the arrangements, and also to arrange that the Bill, as altered and amended, and also the agreement for carrying out the proposals with respect to the rights of way, the proposed new road and bridge, and the purchase of land adjoining the sewage pumping-station, be settled by Counsel in behalf of both parties." Whereupon it was moved as an amendment by Mr. Blackall Simonds, and seconded by Mr. Colebrook—"That the report of the Sub-Committee be referred back to them for further consideration." The amendment having been put, was declared to be lost, only the mover and seconder having voted for it. The original motion was then put to the meeting, and carried with two dissentients.

The report having been entered on the minutes of the Council,

Alderman HEWETT proposed that it should be approved, and that the resolutions adopted by the Committee on the 22nd ult. should be adopted and confirmed by the Council.

The motion was seconded by Alderman ANDREWES.

A long discussion took place, but finally, after Mr. Colebrook had talked of moving an amendment, but had withdrawn from that position, it was put to the Council, and carried with two dissentients.

TISBURY GAS COMPANY, LIMITED.—A Company with this title was registered on the 21st ult., with a capital of £2000, in 400 shares of £5 each. The object is to erect works for the supply of the town of Tisbury, Wiltshire, and neighbourhood with gas; also the trading with such substances as may arise from the manufacture of gas.

MIDLAND ASSOCIATION OF GAS MANAGERS.

(*Continued from p.* 135.)

The only paper read at the recent meeting of this Association was one by Mr. W. North, of Stourbridge, and was descriptive of a gas washer patented by Mr. A. P. Ker, of Birmingham. An illustrated description of this invention appeared in the Journal, Vol. XXXIV., p. 636. The paper was as follows:—

A NEW FORM OF WASHER.

The subject which I have the honour to bring before your notice is a new form of gas washer or scrubber. The important part which washing and scrubbing play in the process of gas manufacture is too well known amongst you, and has been so often commented upon by able members of this and kindred Associations, that it will be unnecessary for me to dwell upon it. An apparatus by, and in which the process is carried on forms the subject of this short paper; and it is agreed upon on all hands that washing and scrubbing is not only essential but positively necessary for the economical and thorough purification of gas.

Washers and scrubbers are perhaps more numerous and diverse in form and manner of working than any other part of the various plant of gas-works, and the one under notice being a new one which may not have come under your observation, is my excuse for bringing it before you.

For the purpose of augmenting the scrubbing power at the Stourbridge Gas-Works I was induced to recommend the erection of a washer patented by Mr. A. P. Ker, the Superintendent at the Adderley Street gas-works of the Corporation of Birmingham. It is placed so that the gas from the original scrubber passes through it on its way to the oxide purifying-boxes. The form of the washer is rectangular, and its internal dimensions are 8 feet long, 4 feet wide, and 2 feet deep. It is placed upon two slight walls to keep it above the ground, for convenience of approach. The details of the interior I will now endeavour to describe, as well as its manner of working.

I have before stated that it is a rectangle in section. In the bottom plate are two transverse openings or slots running nearly the whole distance across it. These are covered on the outer side by a semi-circular pipe having a branch in the middle for connecting the inlet thereto, and the slots are carried through the bottom plate, and stand clear of it a sufficient distance (in this case 3 inches) to allow for the water necessary for its proper action. Covering each of the slots on the inner side, is a hood partly composed of wrought, and part of cast iron. In shape the hoods somewhat resemble shallow square boxes inverted, with one end taken away and the bottom inclined from the horizontal. The outlet edges of the hoods terminate at the water-line, and the incline, which is not arbitrary, is in my case 1 inch in 4 feet, giving a pressure of 1½ inches from inlet to outlet. Fixed to the under side of the hoods, and extending transversely through them, is a width of corrugated wire weaving of about ½-inch mesh, and carried to the outlet edge of them. An overflow-pipe is fixed at the level of the outlet edge of each of the hoods, and carried down into a sealed cistern underneath, to allow the liquor to run off. The upper tray and hoods are made in a precisely similar manner, and are only a repetition of the first ones. The apparatus is fed in the usual manner with an ordinary syphon, fixed upon the top of it.

The manner of working the apparatus is as follows:—The inlet gas passing up through the slots into the back part of the hoods depresses the water until it is below the corner or inner edge of the inclined part, when the gas commences to pass along, driving the water before it, which leaves the wire weaving saturated and dripping, and the gas in its passage is broken up into small quantities about 30 different times in its passage along one plate, and is brought into direct contract with the water on its way. The gas having a pulsatory motion allows the water to return again, after its passage, to saturate the weaving again, and so on *ad infinitum*. It is only necessary to give the requisite feed water to ensure its continuous action. It gives a pressure of from 2 to 3 inches, and has no intricate working parts, consequently little wear and tear or liability to derangement. The weaving being enclosed cannot oxidize, and is likely to last as long as any other part; neither can it become clogged or choked with tar, owing to the continuous oscillations of the liquor.

During the time the washer has been working I have considerably increased my sale of ammoniacal liquor, which in itself has paid for the outlay, besides the relief given to the purifiers.

The overflow water is weak, owing to the small quantity of ammonia passing the scrubber, and another reason is owing to the large size of the cistern, and consequently large quantity of water to be retained in the top tray of a weak nature to accomplish the purpose intended. If the washer had been made 4 feet long instead of 8 feet, with trays 2 feet long each, and the same inclination—that is to say, ½ inch in the 2 feet—and instead of having two trays four had been used, it would have given the same amount of washing surface, and would, in my opinion, have been a much better arrangement, for then there would only have been half the quantity of water necessary to keep the upper tray sufficiently clear to do its work effectively; the pressure would not have been increased; it would have required less space for fixing; and I am convinced it would have been more efficient. This view is concurred in by the Patentee, who intends constructing the washers for the future in the modified form.

As to the working results, I shall have less to say than I expected, and for this reason: I find that with our maximum make—301,000 feet per diem—from some cause or other the washer does not take out all the free ammonia; while with half that make, and with, say, 15 to 17 gallons of water per ton of coal, the gas at the outlet of the washer was practically free from ammonia. This has been mentioned to the Patentee, and hence his intention to alter the form of the apparatus.

The oscillation of water in the washer is considerable, and my impression is that this motion does at some point leave the wire weaving quite unsealed, and so a portion of the gas may pass without being thoroughly washed. This would be obviated in the modified form.

As regards the quantity of liquor made, we can produce from 35 to 37 gallons of liquor per ton of coal carbonized, the strength of liquor being 5½° to 6° Twaddel; and, believing that the principle is right, I have no doubt but that the apparatus can be made to do for 300,000 cubic feet what it does for 150,000 cubic feet. It has the advantage of being simple and comparatively inexpensive, needing little foundation, being easily fixed, and it wants no machinery to work it.

I would add that ours is the only one that has been made on a working scale, and we are all aware that inventors do not always succeed in producing a perfect article at their first attempt; but I have no doubt that Mr. Ker will succeed in producing an effective apparatus on his principle.

The President asked for information with reference to the cost of the apparatus.

Mr. North said the one he had at work was presumed to be equal to a make of 500,000 feet per diem, and it was fixed for £50.

Mr. Jones said he understood that this washer did not eliminate the whole of the ammonia. That its performance was very good, he thought could not be doubted; but he should like to ask the author of the paper if he could give the percentage of sulphuretted hydrogen and carbonic acid, as well as the strong ammonia in the liquor when it was removed from the washer. He (Mr. Jones) held that washing was one of the cheapest methods of purifying gas, and its cheapness depended upon the degree to which the water used in the washing could be impregnated with the gases required to be eliminated; and he should, therefore, be obliged to Mr. North if he could tell what percentage of these gases the apparatus he had described removed from the foul gas. This would give an idea of the degree of foulness of the gases which the purifiers had to deal with when it went forward.

Mr. Hunt did not remember that Mr. North described what apparatus he put the gas through before arriving at this washer. He also asked how much liquor was obtained.

Mr. Cooper (Banbury) inquired what it cost Mr. North for purifying previous to the erection of the washer.

Mr. North said he was sorry he was not in a position to give the particulars asked for by Mr. Jones; but he would endeavour to obtain them. With regard to another question asked, he said they had a scrubber 25 feet high and 6 feet diameter; also one set of condensers before the scrubber, and then came the washer. He thought they obtained 16 gallons of liquor per ton of coal carbonized more than before the washer was put in.

Mr. Hunt: What is the average strength?

Mr. North: 5½° to 6° Twaddel.

The President: What was the strength of the liquor before? I should suppose it reduces it.

Mr. North: It does reduce it.

Mr. Jones: The net gain is 16 gallons of liquor per ton.

Mr. North said that was so; but they must be aware from what the washer did that the liquor was weak when it came from the apparatus. He thought there would be an advantage in this respect when the washer was modified. As regarded the cost of purification, he could hardly say what the gain was. They, however, looked more for a gain in the liquor, and that was their object in having the washer to increase the quantity and keep it the same strength on the average, though they did not overlook the advantage of taking the last trace of ammonia out of the gas.

The President thought it was very plain, from what Mr. North had said, that there were advantages to be gained from washing. This, of course, they all knew; but what was a proper washer they perhaps were not so satisfied about. The apparatus Mr. North had introduced to their notice seemed on paper to be effective, and with his experience and the alteration to be made, he (the President) had no doubt it would be of much more use. He could only say that it was by such discussions and inquiries as they had had that they obtained information; and he moved that the thanks of the meeting be given to Mr. North for his paper.

Mr. Annan seconded the motion, which was carried.

Mr. North, in acknowledging the vote, said he should always be glad to contribute to the Association what facts came within his knowledge. On this occasion he would have been more satisfied if he had had a perfect apparatus to describe.

Vote of Thanks to the President.

Mr. Davies (Kidsgrove) said: It is customary on these occasions to propose a vote of thanks to the President, and I am sure we cannot pass him by without carrying out that good old custom. The manner in which he has presided over this meeting has afforded pleasure to every one here. I propose that our best thanks be given to the President for his services in the chair.

Mr. W. Winstanley (Newcastle-under-Lyme): I have great pleasure in seconding that proposition.

The motion was put and carried.

The President acknowledged the compliment, and said: I hope we, as an Association, shall go on prosperously to the end of the chapter; that the Association will prosper under our care; and that we shall all be benefited by our connection with it.

NEWPORT (MON.) GAS-WORKS BENEFIT SOCIETY.

On Monday, the 26th ult., the Fifth Annual Dinner of this Society was held. Mr. T. Canning, the Engineer of the Company and Treasurer of the Society, presided; and the vice-chair was occupied by Mr. J. Whitefield, Secretary of the Society. At the close of the dinner, the usual loyal and patriotic toasts were given. After which,

Mr. T. Jones proposed "Success to the Newport (Mon.) Gas Company."

The Chairman responded. He said the Company had been successful, and he hoped would continue to be, though their prosperity was like that of other companies in the town—they only prospered as the town did. The staple of their manufacture was coal; and this was raised locally. The expenditure which they went to for the coal was distributed locally; so that, in every way, the town was connected with the Gas Company, for the latter formed an integral part of the former.

Mr. J. Bowen next submitted the toast of "The Chairman and Board of Directors of the Newport (Mon.) Gas Company."

The Chairman returned thanks on behalf of the Board of the Company. He said he would convey to them the hearty reception awarded to their names.

In responding to a toast of "The Mayor and Corporation of Newport," Mr. Vaughan said there was a good relationship existing between the Gas Company and the Corporation, and this was due in a great measure to the Engineer of the Company—Mr. T. Canning. He (Mr. Vaughan) was pleased to hear of the very flourishing condition of the Society; and adverted in gratifying terms to the opening of a subscription at the gas-works for aiding the destitute people in the West of Ireland. In conclusion, he thanked all for the warm feeling evinced towards the Mayor and Corporation of the town.

The Chairman then proposed "Success to the Newport (Mon.) Gas-Works Benefit Society." He said he believed the Society had done a great deal of good. The Society was now in its fifth year. Its members had collected the sum of £230 12s. 6d., of which they had disbursed to the needy £116, and the remaining £114 had been distributed as dividends. A certain balance was also in the bank. Since the first meeting they had interred two members, and also two members wives, and eight children, at the expense of the Society. They incorporated with them the *employés* of the Water-Works Company, the Secretary of which (Mr. Charles Cullum) was unable to be present. Donations to the Society had grown larger, and its funds increased, so that they had been able to subscribe towards the Indian famine and the Abercarne explosion funds, and were now doing something towards relieving the West of Ireland destitution.

Mr. J. Whitefield, Secretary of the Society, who responded, read the balance-sheet for the past year. There was a balance left in the bank of £6. Twelve months contributions, entrance fees, &c., £53 8s. 10½d.; balance from last year's dividend, 10s. 1d.; donations, £9 4s.; interest from the bank, 7s. 1d.—total, £69 10s. 0½d. Expenditure: Members for sick pay, funerals, &c., £27 13s. 5d.; stationery, £1 12s. 11d.; balance in hand, £6 7s. 1d.; paid out to members as dividend, £33 16s. 7½d. This, he said, was a good balance-sheet for the past year.

Among the toasts which followed were "Success to the Newport and Pillgwenny Water-Works Company," proposed by Mr. Stockwell, and

responded to by Mr. Sheppard in the absence of Mr. Cullum; "The Manager and Engineer, Mr. Canning," proposed by the Vice-Chairman, and responded to by Mr. Canning; "The Officers of the Newport (Mon.) Gas Company (coupled with the names of Mr. Hazell and Mr. Fiddes)," proposed by Mr. Dudley, and replied to by Mr. Hazell, Mr. Fiddes contributing a song; "The Donors of the Society (coupled with the name of Mr. T. Spittle)," proposed by Mr. Hopkins, and replied to by Mr. T. Spittle, jun.; "The Officers, Committee, and Stewards of the Society," proposed by Mr. Donovan, and responded to by Mr. Whitefield.

SALE OF SHARES IN THE NEW RIVER COMPANY.

At the Auction Mart, Tokenhouse Yard, on Wednesday last, Messrs. Edwin Fox and Bousfield offered for sale two fifteenths of a King's share, and fifteen £100 new shares in the New River Company. As some interesting particulars relating to this great undertaking and its three classes of shares (King's, Adventurers, and New) were given in the JOURNAL as recently as Dec. 2 last, it is unnecessary to repeat them, further than to say that each original share in its entirety is worth about £95,000, and any portion of it is freehold estate, and confers upon its possessor voting powers for the counties of Hertford and Middlesex. The dividend on these shares last year was at the rate of £2200 per annum, and in 1874 a bonus of £1008 per share was declared. The new shares rank *pari passu* with the original, but do not confer parliamentary voting powers. The dividend on the shares at Midsummer last was at the rate of £10 3s. 8d. per cent., and in 1874 a bonus of £4 15s. 6d. apiece was declared upon them.

In opening the sale, Mr. BOUSFIELD briefly alluded to the increasing income of the Company, to the abundance and excellent quality of their water, and to their vast landed estates, the whole undertaking constituting, he said, an excellent and perfectly safe investment. Referring to the action now being taken by the Government in reference to the Metropolitan Water Companies, he said that in the event of the New River Company's property being, at an early date, acquired by the Crown, the proprietors would obtain the maximum value for their shares, and the equivalent in a first-class Government security, and no doubt would still be left in possession of their large landed estates; on the other hand, should the purchase be delayed, a certain increase in the income of the Company would ensure even greater advantages in the future.

He then proceeded to take offers for the King's shares, which were put up in 20 lots, each representing the 150th part of an entire share, and realized the following prices:—Lot 1 and lots 17 to 20, £630 each; lots 2 to 16, £625 each—total, £12,525. The new shares were sold—4 at £380 and 11 at £385 each—total, £5755.

The prices obtained for the portions of the King's share were rather lower, and for the new shares rather higher than those realized at the sale of similar stock in November last.

In all cases the shares were sold inclusive of the dividend accruing to June 30 next.

EDISON'S LATEST DEVICE REVIEWED BY AN EXPERT.

Colonel Makins, one of the Directors of the Chartered Gas Company, has kindly forwarded to us a copy of the *American*—published in Baltimore—of the 4th inst., in which is an account, under the above heading, of an interview between one of their reporters and Mr. Hambleton, Manager of the Baltimore Gas-Works. The account is worth reproducing in its entirety. It is as follows:—

A representative of the *American* yesterday met a gentleman prominently connected with the gas interest, who, during the past week, spent a day and night at Menlo Park with the object of examining Edison's latest form of electric illumination, and comparing it—principally in respect to cost and practicability for domestic usage—with gas. This gentleman was willing to state, in the briefest possible compass, the reasons that influence his positive opinion that the electric light, as now displayed at Menlo Park, cannot become a successful rival of gas. He had conversed with Professor Edison, and the figures with regard to the latter's plans are given just as he stated them.

The following expresses Edison's projects for lighting in large cities, and the comments passed upon them by the gentleman from whom this information is derived: "In the first place," said he, in answer to questions of the *American* representative, "Edison proposes to use in cities engines of 1000-horse power each, which would give him 8000 lamps, his calculation being on the basis of 1-horse power for 8 lamps. Now, suppose we estimate that, on the average, there are 25 houses in each block in a city—say Baltimore—seven blocks would make half a mile, comprising one side of a district, so that in a district embracing a quarter of a square mile we should have 1225 houses. Edison admits that with his 1000-horse power, or 8000 lamps, he can only provide illumination for a district of this size, and, consequently, the proportion for each house would be less than 7 lamps. Say that Baltimore comprises six square miles, it would require 24 1000-horse power engines to cover that ground; and this engine power, at Edison's own calculation, would give only 192,000 lights, each of which is of less intensity than a good gas-jet."

"Is that a fact as to the luminosity of his carbonized paper horseshoe lamps?"

"Edison has not made a photometric test; but to my eye his light is not equal to 16-candle power. There are 25,000 consumers of gas in Baltimore, besides 4000 or 5000 street-lamps. In the 24 hours of Christmas day and night there was burned in this city 3 million cubic feet of gas, which, of course, was all made or stored during the preceding 24 hours. Edison's machinery would have to be adequate to furnish these 3 million feet between the hours of five and twelve o'clock p.m., as he cannot store electricity, but must produce it as it is called for. Divide 3,000,000 by 7, the number of hours during which there was the heaviest demand for gas, and we have 428,570 feet as the hourly consumption, or equal to 100,000, in round numbers, of Edison's horseshoe lamps. But, for a proportion of these 7 hours the rate of gas consumption was double that, or equal to 200,000 of Edison's lamps. We see that his two dozen 1000-horse power engines would just fall a little short of doing this, even granting that he can accomplish what he expects in the ratio of horse power to light. But the most he has done is to light 40 lamps with an engine capable of working up to 80-horse power, and he has not lit more than 40 lamps from one of his electric generators."

"How about the stations and districts?"

"Edison names 1000-horse power as generating as much electricity as he can dispense from one station, and the district is to be only a quarter of a square mile, otherwise the distance would be too great for the operation of his system. If he has one station to start with, he must obtain as customers all the consumers in that district of a quarter of a square mile, for he cannot travel outside of it to get customers without establishing a new station, with all its apparatus of boilers, engines, generators, &c. By his own figures there must be 200 generators to each engine to convert its steam power into electric force. A 1000-horse power engine and its appurtenances, such as coal-yard, &c., in the centre of a choice district in the city, would occupy a large amount of valuable ground. His smoke-stack would be another formidable affair; for, when he was burning 300 lbs. of coal hourly, which his engine would require, a stack enabling him to deliver the products of combustion high enough in the air not to create a nuisance must be very costly. Buildings to accommodate all this machinery would necessitate a huge outlay; and think of 24 such stations in the city! This is only a theoretic deduction from his experiments, and it is doubtful whether he can do on a large scale what he does in his laboratory. Then there comes in the question of the labour about such an establishment, which, again, would be very costly. I will show you something bearing upon the expense. At the West Side pumping-works in Chicago, an engine worked at about 400-horse power, but capable of 600, was run for 55 days in November and December, 1876. The cost of running was—for salaries and wages, 1430 dols.; oil for cylinder, 101 dols.; lard oil, 142 dols.; tallow, 18 dols.; packing, gaskets, &c., 127 dols.; sundry expenses, 7 dols.; lighting the building, 524 dols.; repairs, 45 dols.; making a total of 2394 dols., or about 44 dols. per day. This is exclusive of coal, of which there was burned 1,080,000 lbs."

"How would Edison's total of expenses stand?"

"His 1000-horse power engine would take at its maximum working 25,000 lbs. of water per hour for conversion into steam. If he used a condenser, it would take even more. That is over 3000 gallons of water hourly, and 3000 lbs. of coal for each engine. He must have all this, for the reason that he has to be prepared at any moment to give his customers the outside quantity of electricity needed. A gas company can take a day or two to make the illuminating element that Edison must furnish immediately, and therefore his plant is very expensive. His conductors are to be laid in underground tubes, and be insulated on the inside. These tubes will cost as much per foot as the smaller gas-pipes, and the cost of the copper wires for conduction is another considerable item. The skilled labour required to lay these tubes and wires would be at least twice as expensive as that of the men who do the corresponding work for the gas corporations. You will see that there is altogether involved the cost of the engines, boilers, and generators, together with that of the city property needed for the stations, the outlay for the buildings, coal, water, labour, and the expense of conductors for the current, and the aggregate must certainly go so far beyond the cost of gas that there can be no comparison between the two methods of illumination. The gas companies have their mains and pipes already in place, and Edison must supplant the whole system. They are already occupying the ground, and if their plant had to be written down, still the people could not afford to throw it away. The probability of Edison being able to compete successfully with gas can be judged from the fact that he has now a light inferior in illuminating strength and superior in cost, and he cannot modify it as we do gas, by regulating the flow, but it has to be burning in full or not at all, making it necessarily expensive to the consumer. At Menlo Park they do not hesitate to say they are trying to make something as good as gas, and they admit that they have not as yet succeeded. Now, the limits of the usefulness of gas have not been reached. The era of cooking by gas is so near that it will soon be here, and the price will then doubtless be decreased. Gas saves fuel in the house, on account of the heat given out by the burners, and we have gas-engines that are economical in their operations. The products of the combustion of gas can be easily carried off, and in such a way that they will carry with them the other impurities of rooms, thus conducing to perfect ventilation. Gas can be sent all over a city from one producing point; but Edison's system proposes a station in every district embracing not more than a quarter of a square mile in extent. Altogether, I do not think that the holders of gas stock need fear that Mr. Edison is going to impoverish them."

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

There is still an absence of the animation which had been expected throughout the coal trade of this district, and the improvement which has been reported in the iron trade has not yet been felt in the coal mining industry, so far, at least, as Lancashire is concerned. The cold weather has not even produced any considerably increased demand for house-fire classes of fuel; and of the better descriptions of round coal there has been a good deal of stock accumulating at many of the collieries. Coal for gas-making purposes is, of course, in less demand, and the requirements of consumers will naturally decrease until the usual contracts are made in the summer. For the common classes of round coal there is a moderately fair demand, and good hard forge coals meet with a ready sale; but supplies, as a general rule, are plentiful, as the increased demand has been more than met by the larger output from the pits. Burgy is just now only being made to order, and the requirements are very small. With regard to slack, although the cotton mills are in better operation, and in other branches of industry there is a greater consumption, there is no actual scarcity of supplies. A few of the colliery proprietors are pretty well sold, and have very little to offer, but there are many others where slack, if anything, is rather a drug, and although there is the expectation that higher prices will be obtained, the larger stocks which are still held have a natural tendency to keep down prices at present. So far as prices generally are concerned, there is, if anything, rather a weaker tone, and holders of stocks will in many cases give way a little to effect sales for prompt delivery, but there are very few colliery proprietors who will quote forward at present rates. The average quotations at the pit mouth are about as under:—Best Wigan Arley, 8s. 6d. to 9s.; seconds, 7s. to 7s. 6d.; Pemberton four-feet, 6s. 9d. to 7s. 6d.; common round coal, 5s. 6d. to 6s.; burgy, 4s. to 4s. 6d.; good slack, 2s. 9d. to 3s. 3d.; and common, 2s. 3d. to 2s. 6d. per ton.

An active demand is maintained for coke, and prices are firm.

In the iron trade there has not been much change since last week. For pig iron, prices appear to be about stationary at present, No. 3 foundry and No. 4 forge Lancashire, delivered into the Manchester district, remaining at about 70s. per ton, less 2½ per cent. For forge numbers there is a good demand, but foundry is rather difficult to sell. In the finished iron trade, business continues very brisk, with a good inquiry from America for both hoops and bars. For hoops, delivered equal to Manchester or Liverpool, about £10 10s. per ton is asked, and for bars from £9 to £9 15s. per ton.

There is no material improvement to report with regard to the position of founders, engineers, and machinists.

THE COAL AND GENERAL TRADES OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

Contracting for delivery of coals over the year was continued in earnest last week. A quantity of the best steam coals were thus sold at 10s. per ton for forward delivery. Several of the large Northumberland collieries are indisposed to sell any more at that rate at present. Some large contracts have been made for the delivery of the highest qualities of gas coals, too, to be shipped in the Tyne Dock. The contract rate is 7s. per ton, less 2½ per cent. Second-class gas coals of a fair sort are offering at 6s. 6d. per ton, less 2½ per cent. discount. Sailing vessels are loading gas coals for the ports in the Lower Baltic. The freight is higher this year.

The upward tendency in the price of coke is checked, but recent advances are strongly maintained. There is a great amount of contracting complete for the first half year. Durham small coals hold an excellent position in the market. The quotation for good average sorts is 4s. to 5s. per ton. There is no inquiry on the Tyne for house coals. During the entire history of the trade, scarcely has it ever been in such a depressed condition as this winter. There was no advance in the prices of best Durham house coals in January upon what they were in September. The Yorkshire collieries are competing with Durham collieries in the sale of gas and house coals. There has of recent years been a great development of the Yorkshire coal trade shipping at Hull, Grimsby, Goole, and other places. The shipments of coke from the Tyne to Spain are improving. Germany has recommenced to import Tyne coke. It has done very little of this over the past three years.

Some very large contracts were made for the best Northumberland steam coals at Newcastle on Friday, at 10s. 6d. per ton.

There were some large sales of fire-bricks on the Tyne last week. Business is very brisk in this trade at Derwent-Haugh, Blaydon, and other parts of the river.

Coasting freights were about 3d. per ton lower last week. The rates that were paid small vessels to load gas coals were—Folkestone, 6s. 4½d.; Teignmouth, 6s. 4½d.; Cowes, 6s. 7½d.; London (Ratcliff wharf), 5s. 6d. and 5s. 9d.; Rochester, 5s. 6d.; Dublin, 8s. 6d.; Plymouth, 6s.; Devonport, 6s. 6d.; Poole, 7s. 6d., for small ships; Waterford, 8s.

The price of lead has kept up. The iron market in the Cleveland district was a little flat last week. The manufacturing and foundry trade of the Tyne, however, is very brisk.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

The first annual general meeting of the Falkirk Lighting Company, Limited, was held on Thursday last, Mr. James M'Gilchrist, Chairman of the Company, presiding. The report of the Directors, previously circulated, was taken as read, and in referring to it the Chairman spoke of the great improvements which the Company had carried out during the past year, and stated that the result of the first year's working was very satisfactory. A good dividend was declared, and a handsome balance was carried forward to next year's account. It is the intention of the Directors before long to reduce the price of gas 5d. per 1000 cubic feet—that is to say, from 5s. 10d. to 5s. 5d. per 1000 feet. When this reduction in price takes place, the gas consumers of Falkirk will have their gas at 1s. 3d. per 1000 feet less than they were paying for it previous to the purchase of the gas-works by the present Company. For many years they were charged at a much higher rate than the gas consumers of other towns similarly situated. However, when the further reduction referred to comes into force, they will be supplied with gas on as favourable terms as are in operation in almost any town of like size in Scotland.

A very commendable act has lately been done by the Dumbarton Corporation Gas Commissioners. They have issued a brief notice to gas-fitters, and all persons connected with the building trades of the town, or those who are about to build. The circular states that a large percentage of the consumers complaints of "bad gas" are due to the small pipes that have been fitted into all classes of property in Dumbarton, without any regard being paid to the quantity of gas which the pipes require to pass, so as to give the jets a proper supply at a pressure low enough to ensure the most satisfactory and economical consumption of the gas. In order to prevent such complaints, and to save proprietors the expense and annoyance of every now and then cleaning and enlarging their gas-fittings, they indicate the sizes of pipes that should be used, the lengths that may be required, and the greatest number of burners that may be used with the given sizes and length of piping. So far as new properties are concerned, the Gas Commissioners reserve to themselves the right to refuse a supply of gas until the conditions laid down in their instructions are conformed to. The smallest size of pipe that is allowed is one having an internal diameter of ¾-inch.

Owing to the rapid extension of the residential village of Kilmalcolm, and the opening of a very large hydropathic establishment there, it has been found absolutely necessary to increase the productive and storeage capacities of the local gas-works. With that object in view, a conference was held during the past week between the Directors of the Gas Company and those of the hydropathic establishment.

Mr. Alexander Smith, Manager of the Aberdeen Corporation Gas-Works, delivered an interesting lecture on "Artificial Light," on the evening of Monday, the 26th ult., before one of the leading literary societies of that town. He traced the history of artificial light from the primitive appliances of our ancestors to the most recent improvements in gas and electricity. A number of the lights alluded to were shown in illustration of the lecture.

Business was done on Friday in Glasgow Gas Annuities at £222 5s., and in shares of the Edinburgh and Leith Gas Company at £28 10s.

Messrs. Robert Napier and Sons, the eminent shipbuilding firm of Glasgow, made an experiment with the electric light a week or two ago, during the morning and evening hours, in lighting up the new storeship which they are building for the Admiralty. The result proved to be so satisfactory that they have now erected a second dynamo-electric machine and lamp in the ship-yard, specially for the lighting of a large steel steamer, a vessel of 5500 tons, for the Montreal mail service, conducted by the Allan line. Both lights were in use in the open yard about four hours per day during the past week.

The Works Committee of the Dundee Water Commission lately had under consideration an application from the inhabitants of Carnoustie for a supply of water; and after discussion they agreed to recommend the Commission to allow water to be taken from the Monikie reservoir at 3d. per 1000 gallons, the applicants to bear all the expense of leading the water from the reservoirs and distributing it through the village.

A meeting of the Irvine Water Commissioners was held on Thursday evening—Provost Brown presiding. The Clerk read a letter from the Kilwinning Local Authority, containing the resolution passed at the last meeting of that body, namely—"That the meeting agree to purchase the water required to supply the district from the authorities of Irvine and Dundonald at the rate of 3½d. per 1000 gallons." Bailie Orr moved that the authorities agree to supply Kilwinning on the basis proposed. Mr. Wm. Henderson, chemical manufacturer, submitted that if Kilwinning obtained a supply of water at 3½d. per 1000 gallons, the public works of Irvine ought to have water at the same rate. Bailie Orr pointed out that it cost the Irvine authorities 3½d. per 1000 gallons to bring the water from the Munnoch Hills to Muirside Toll, the place where Kilwinning proposed to make a connection, but to bring the water to Irvine the prime cost was, as near as possible, 4¼d. per 1000 gallons. The works, therefore, could not have the water at the same price as Kilwinning. The motion was agreed to. The meeting then proceeded to consider as to the rate to be charged per 1000 gallons for water supplied for trading or manufacturing purposes. Mr. Barr moved that 4½d. per 1000 gallons be charged, which was seconded by Mr. M'Cormick. Mr. Breckenridge moved, and Mr. Baunatyne seconded, that the charge be 4d. per 1000 gallons. On a division, the motion was carried by 16 votes to 6. Bailie Orr said if the works did not accept the terms offered they were bound to go to the Sheriff as arbiter.

The delivery of water into Edinburgh on the 27th ult. was equal to 36·28 gallons per head per day over a population estimated at 298,350.

Last week's Glasgow pig iron market was generally dull and irregular, with a tendency towards flatness, the price on Friday, at the close, being 68s. cash, and 68s. 6d. one month.

The coal market is moderately steady, but the amount of business doing is limited, especially in the shipping department, in which there are no signs of immediate improvement. The steamship *Cid* left the Clyde on Thursday morning, bound for Havana, with 1850 tons of gas coal on board.

The Paris Gas Company have recently introduced some improvements in the lanterns used by them with their large gas-burners. The new arrangement consists in placing in the lower part of the lantern a ring of metallic gauze, by means of which a current of air is caused to play over the inner surface of the glass, and pass away in the direction of an opening formed in the upper portion of the lamp. The cooling of the glass effected by this air current is assisted by a cone, which is intended to carry off the products of combustion. The cone is attached to the other metallic parts of the lantern at a very few points only, and around these cold air circulates; so that no matter to what degree the temperature of the cone is raised, the least possible effect is produced upon the glass, while the upper portion of the lantern is not unduly heated. The advantage of the new arrangement is that it allows of the employment of burners of much higher power than was possible with the form of lantern originally adopted.

Worcester New Gaslight Company.—At the half-yearly meeting of this Company last Thursday, a dividend at the rate of 10 per cent. per annum was declared.

The Gas Engineer's and Superintendent's Pocket Almanac.—We have received the copy of this useful publication for 1880, which is issued by the American Meter Company, of Philadelphia. Several changes have been made in the book since we noticed it on a previous occasion, the year before last. The character of the work is well maintained; and it will doubtless be found of much service to those to whom it is sent. We may state that it is a private publication of the above-named Company, and is not on sale.

Grimsby Water Company.—The Directors of this Company, in their annual report just issued, state that the balance available for dividend is £1549 1s. 2d., out of which they recommend that £200 should be carried to the reserve-fund; £1260 be paid as dividend at the rate of 6 per cent. per annum for the half year; and the balance, £89 1s. 2d., be carried over to the credit of the next account. The new well is stated to be completed, and in every way a thorough success. The revenue account shows the receipts to have been £3959 4s. 2d., and the expenses £2573 1s. 11d. The receipts from interest on the reserve-fund, and estimated debts for water yet uncollected, come to £1609 1s. 2d., which, after a deduction of £60 owing by the Company on revenue account, leaves the amount above-stated available for dividend.

Map of the Metropolitan Water Companies Districts.—Mr. Preston Davies, of Nos. 5 and 6, Victoria Street, Westminster, who some time since prepared a coloured map of London showing the boundaries of the districts of the Metropolitan Gas Companies, which met with a very favourable reception, has now prepared a similar map, showing the boundaries of the districts of the Metropolitan Water Companies. Mr. Davies has had much experience in works of this description; and, possessing unusual opportunities for securing accuracy of detail in reference to the limits of the boundaries of the several Companies, has produced a map that may be implicitly relied upon, and one which is drawn upon a scale that renders it very suitable for office purposes.

The Supply of Water by Meter.—On Wednesday, the 21st ult., at the Walsall County Court, before Mr. W. D. Griffith (judge), the case of *The South Staffordshire Water-Works Company v. Peter Bull* was heard. The point involved was as to the consumption of water by meter. The Company sued the defendant for £18 9s. 8d., the balance of an account for water supplied under an agreement at a certain rate per 1000 gallons, according to the registration of a meter fixed by the Company. The defendant objected to the claim, on the ground that he believed the meter registered more water than he used; but the Judge decided that, in the absence of proof of this, the agreement to pay according to the registration of the meter was binding, and his decision was accordingly given in favour of the Company for the full amount claimed, and costs.

The Gas Supply of Waterford.—Last Tuesday, a special meeting of the Corporation of Waterford was held, for the purpose of receiving a report from the Gas Committee as to the arrangement to be made with the Gas Company for the public lighting of the city. The Town Clerk read the correspondence between the Company and the Committee, from which it appeared that they were willing to accept the offer of the Company to light the city at £3 16s. net per lamp per annum, on condition that the charge for gas to private consumers should be reduced to 4s. 6d. per 1000 feet. The Company, in their reply, declined to mix up the question of public and private consumers, and sent in a bill for over £800, which was due to them by the Corporation. It was resolved to pay the Company £3 16s. per lamp, the amount to be paid within a month after it becomes due, or else interest at the rate of 5 per cent. to be charged.

The Worcester Town Council and the Liverpool Corporation Water Scheme.—Last Tuesday, in accordance with the provisions of the Municipal Corporations (Borough Funds) Act, a public meeting of owners and ratepayers in Worcester was held, for the purpose of considering the advisability of opposing the Liverpool Corporation Water-Works Bill, 1880, and, if the meeting so determined, of giving consent to the opposition initiated by the Town Council. Little interest was manifested in the proceedings, there being only about 40 persons present at the commencement of the meeting, and at no time were there more than 200 people in attendance. The Mayor, who presided, explained the objects of the Bill, and how it was thought it would injuriously affect the town of Worcester. He moved, and Alderman Dingle seconded, a resolution authorizing the Corporation to take the necessary steps to oppose the measure in Parliament. When put to the vote, the motion was carried by a large majority—only 8 hands being held up against it.

Whitworth Vale Gas Company.—The Directors of this Company, in their report to the Shareholders for the half year ending Dec. 31, say that the depression which they have previously had to report in the district has continued to exist during the last half year, with the exception of a few weeks. The gas-rental for the half year amounted to £1596 11s. 10d., against £2074 12s. 1d. for the corresponding period of the preceding year, showing a decrease of £478 0s. 3d. Notwithstanding the lessened consumption of gas, it is, they say, very satisfactory to find such a large increase, in proportion, in the receipts for tar and ammoniacal liquor, thus amply justifying the outlay incurred in putting down the new condensing and scrubbing apparatus. The result of the half year's working is a profit

of £656 6s. 6½d., out of which the Directors recommend a dividend at the rate of 6 per cent. per annum, free of income-tax. This will absorb £499 13s. 7d., and allow of £156 12s. 11½d. being carried to the next half year's account. The last dividend paid was at the rate of 5 per cent. per annum, and the one previous to that at the rate of 7½ per cent.

MANCHESTER CORPORATION GAS-WORKS LOAN.—On Tuesday last an inquiry was held at the Manchester Town Hall, by Mr. S. J. Smith, one of the Local Government Board Inspectors, as to an application made by the Corporation for power to borrow £250,000 for purposes connected with their Bradford Road gas-works. Alderman Lamb (Chairman of the Corporation Gas Committee), Mr. Talbot (Deputy Town Clerk), and other gentlemen were present. Mr. Talbot explained that the application had reference to the new gas-works of the Corporation at Bradford-cum-Beswick, and said that the sum already expended on these works had been £316,961, and that in order to complete the existing contracts a further sum of £61,774 was required. The estimated cost of the necessary apparatus for gas-making and of four gasholders was £120,000, making a total of £498,735. Under the Corporation's Act of 1875 they were only authorized to borrow £250,000, leaving a balance required of £248,735. It was therefore proposed, and application was now made to borrow £250,000. Alderman Lamb and Mr. J. J. Harwood supported the application, and stated that when the works were completed the cost of them would be £750,000. The inquiry being concluded, the Inspector paid a visit to the works.

CARLISLE CORPORATION GAS AND WATER SUPPLY.—We have been favoured with a copy of the accounts of the Carlisle Corporation Gas and Water Department for the year ending June 30, 1879. In our issue of Oct. 21 we gave an abstract of the gas accounts, and have nothing to add except that from the capital account it appears that, during the year, £12,001 15s. 3d. was spent on the new gas-works. We may state that, during the twelve months, the illuminating power of the gas supplied was 19 candles; and the price 2s. 9d. per 1000 feet. As regards the water-works, the capital account shows as follows:—

Total expenditure on works to June 30, 1878			
(less annual depreciations)	£42,632	11	1
Less one year's depreciation, at 3 per cent.	1,278	19	6
		£41,353	11 7
Extensions during the year—			
Mains	£257	9	8
Service-pipes	435	15	1
		693	4 9
		£42,046	16 4

There was a balance on profit and loss account (being profit for the year) of £2362 5s. 10d.; the receipts from water sold being £6388 5s. 6d.

SEWERAGE DIFFICULTIES IN WILTS AND DORSET.—At Salisbury, as also at Weymouth and Dorchester, the inhabitants have for some time been perplexed as to the public drainage and the disposal of the sewage. These difficulties have been increased by the threatened opposition of landowners to any scheme not in compliance with the requirements of the Rivers Pollution Prevention Act. At Salisbury the Corporation have been contemplating the establishment of a sewage farm, which at both Weymouth and Dorchester has been scouted as a most costly experiment, strongly to be avoided. Mr. T. Hawksley, C.E., has presented an elaborate report in regard to the Weymouth drainage. He suggests an outfall sewer to receive in its course the whole of the drainage, and estimates at £25,000 the cost of the works which he proposes. He expresses the opinion that the causes of the effluvia so long complained of can only be completely removed by reclaiming the now submerged land, and thus destroying the lake. This operation may, he says, be effected in either of two ways—first, by raising the ground now forming the bottom of the lake to a level above that of the highest tides, at a cost of £80,000 or £100,000; secondly, by embanking the channel of the River Wey, and draining the reclaimed lands by steam-driven pumps, in the manner practised in the Fens, at a cost of probably £20,000. At Dorchester the Corporation have decided to adopt the precipitation system, the idea of a sewage farm being abandoned on account of its costliness. The Borough Surveyor is preparing a scheme, and this is to be submitted to the Local Government Board for their approval. It is expected that in order to meet the requirements of the Rivers Pollution Prevention Act a very considerable expense will have to be incurred.

SERIOUS GAS EXPLOSION AT CARDIFF.—The *South Wales Daily News* reports that owing to the severe weather the roads in Cardiff are frozen hard, and in many places the water in the pipes leaning to the houses is frozen in the ground under the roadway, hundreds of persons depending on those who are more favourably situated for a supply of water for domestic purposes. All the drinking fountains in the town are stopped from the same cause. Among them is a gas-pillar and drinking fountain at the corner of Westgate Street and the Cowbridge Road. The gas-pillar has a large square basement, on the sides of which are the drinking fountains, approached by massive stone steps. Above the jets of water is a handsome cast-iron pillar, surmounted with three lamps. The basement portion of the post is hollow, and this would be filled with gas in the usual way. On Wednesday morning a man in the employ of the Corporation endeavoured to thaw the water-pipes, so as to obtain a supply of water for the fountain. For this purpose he dug a hole in the ground near the stone steps, and when he had reached the pipe, as he supposed, he made a fire for the purpose of thawing the water. Both water and gas pipes are contiguous, and in a short time the gas-pipe melted, and the fire communicating with the gas, a terrific explosion took place, which blew up the stone steps, smashed the iron pillar in pieces, some of the fragments being thrown a considerable distance. Fortunately no one was injured, but a number of persons had narrow escapes from the falling fragments of the pillar. The serious nature of the explosion was due to the large volume of gas in the basement of the pillar, and the melted ice generating steam.

MR. W. H. PREECE ON GAS *v.* THE ELECTRIC LIGHT.—At a meeting of the Society of Telegraph Engineers, held in the rooms of the Institution of Civil Engineers, Great George Street, Westminster, on Wednesday last, the newly-elected President, Mr. W. H. Preece, delivered his Inaugural Address, on the progress of telegraphy, in the course of which he made the following reference to the electric light and gas. The light had, he said, been making considerable progress, and was gradually forcing itself into practical use, in spite of many of the drawbacks to its employment that had still to be removed. The lamp of the future had not yet been produced, though steadiness and duration had very much advanced during the past twelve months. One of the most notable and useful applications of the light had been on board ship, to further the operations during the night in laying and repairing cables. He was present on board the s.s. *Dacia*, in the Mediterranean, when this was done, and the success was unequivocal. The Brush generating machine had recently been introduced into this country, and its performances were certainly the most advanced form the electric light had yet taken. There were over 800 of these lights in the United States; and it was worthy of notice that it had quietly crept into existence without the aid of the ubiquitous and omniscient newspaper correspondent, or the transmission of any sensational telegrams, to the detriment and discomfort of gas shareholders. Gas was not going to be affected by the electric light. The proper function of gas was to generate heat. Ninety-four per cent. of the ingredients of gas were consumed in generating heat, and only 6 per cent. in producing light. It was remarkable that so amenable and tractable an agent for heating purposes as gas had not been more utilized; but the fact was that the public were ignorant of its properties, careless of its employment, and callous of its defects. It was not too much to say that 50 per cent. of the gas manufactured was absolutely wasted for illuminating purposes by the wild extravagance with which it was burnt, and by the want of those systems of regulation which had been introduced to compensate for irregularities and excesses of pressure.

THE ASHTON, STALYBRIDGE, AND DUKINFIELD WATER-WORKS ARBITRATION.—The *Oldham Chronicle* says: "We very much doubt whether any of the parties to the costly arbitration to determine the value of the Ashton, Stalybridge, and Dukinfield Water-Works will be thoroughly satisfied with the award they have obtained at the expenditure of £22,397 2s. 4d. The Joint Water-Works Committee of the Ashton and Stalybridge Corporations and the Dukinfield, Mossley, and Hurst Local Boards was not only authorized to carry out the Greenfield scheme, but had also to take over the works already possessed by the three first-named Authorities, and the dispute has been as to the price at which these old works should be transferred to the Joint Committee, each body, of course, seeking to enhance the value of its own separate property as much as possible. The existing works of the Ashton Corporation, the Stalybridge Corporation, and the Dukinfield Local Board were, in fact, to be sold to the Joint Committee for as much as they would fetch, and the total cost was to be contributed by the various bodies represented on the Joint Committee, in the following proportions:—Ashton 259 parts, Stalybridge 185 parts, Dukinfield 111 parts, Mossley 75 parts, and Hurst 45 parts; it being, of course, understood that if the value of the plant belonging to any of these Authorities should exceed the amount of its contribution to the total cost, it would have something to receive, instead of having something to pay. It may be interesting to notice the different valuations that were put forth by the different bodies. On behalf of Ashton the figures given were—Ashton, £186,920; Stalybridge, £127,125; Dukinfield, £24,167. The Stalybridge valuation was — Ashton, £168,669; Stalybridge, £131,569; Dukinfield, £22,846. On the other hand, the Dukinfield valuation was—Ashton, £170,148; Stalybridge, £83,288; and Dukinfield, £34,988. It will be seen, therefore, that while Ashton and Stalybridge were agreed in putting down the Dukinfield works at £22,000 or £24,000, they differed greatly as to the respective values of their own undertakings, and that the Dukinfield estimate was in marked opposition to those both of Ashton and Stalybridge, but, being the least in the aggregate, was most favourable to the interests of Mossley and Hurst. After the prolonged arbitration the values have been decided as follows:—Ashton, £173,679; Stalybridge, £124,196; and Dukinfield, £34,287; the result being that if each Authority had consented to make a comparatively slight deduction from its own estimate of its own works, they would have come without difficulty to a conclusion it has cost them £22,000 to arrive at by legal means. Working out the results of the different valuations, we find that the amount to be received by Ashton for its plant, after deducting its proportionate contribution to the general fund, was variously estimated as follows:—Ashton valuation, £57,167; Stalybridge valuation, £44,701; Dukinfield valuation, £59,479; Arbitrators award, £46,226. The amount to be received by Stalybridge, after a similar deduction, was represented as £34,430 according to the Ashton valuation; £43,020 according to the Stalybridge valuation, £4239 according to the Dukinfield valuation, and £33,160 according to the Arbitrators award. Dukinfield was called upon to pay, over and above the value of its plant, as follows:—Ashton valuation, £31,450; Stalybridge valuation, £30,283; Dukinfield valuation, £12,441; Arbitrators award, £20,335. The amount to be contributed by Mossley varied as follows:—Ashton valuation, £37,579; Stalybridge valuation, £35,898; Dukinfield valuation, £32,047; Arbitrators award, £36,906. Whilst the Hurst contribution showed the following variations:—Ashton valuation, £22,547; Stalybridge valuation, £21,539; Dukinfield valuation, £19,228; Arbitrators award, £22,143. Comparing the amounts the various parties will receive or pay under the Arbitrators award with the sums as worked out from their own respective claims, we find that Ashton is £10,941 worse, Stalybridge £9660 worse, and Dukinfield £7894 better off than they would have been if their own valuations had been accepted; while, with regard to Mossley and Hurst, it will be seen from the above figures that their contribution does not vary greatly whichever valuation is taken. In the meantime there is the sum of £22,397 to be paid by the parties as the legal costs of the arbitration."

Register of Patents.

3422.—TASKER, W. J., Halifax, "*Improvements in illuminating apparatus applicable to street-lamps and other gas-burners.*" A communication. Patent dated Aug. 29, 1878.

This invention consists, firstly, in the employment of a clockwork movement attached to each lamp bracket, or standard, by means of which the flow of gas can be increased or diminished at the desired period automatically. The supply-pipe leading to the burner is provided with a cock or tap, the aperture of which is of the proper size to allow sufficient gas to pass through to produce a full-sized flame. There is also a small passage leaving the supply-pipe below the cock, and entering the same above the cock, so as to allow of the constant passage of a small stream of gas to the burner, when the cock is shut off. A small lantern or shield, with perforations, is placed round the upper part of the lamp or burner, and is capable of being raised so as to surround the flame when desired. To the spindle of the stop-cock is attached a two-armed lever, one of the arms of which is attached by a crank pin and rod to a double notched wheel connected with the clockwork mechanism. The other arm is connected with a rod for raising and lowering the small lantern or shield.

The operation of the apparatus is as follows:—When the retaining catch is removed by the clockwork, the notched wheel makes one-half of a revolution before it is again arrested by the catch, and in so doing it either closes the stop-cock, or raises the shield so as to surround the burner, or *vice versâ*. If the stop-cock is closed, the gas still continues to flow through the side passage, leaving a minute flame, which is protected by the shield. When in due course the retaining catch is again removed, the notched wheel completes its revolution, and the gas is fully turned on, and the shield lowered.

Secondly. The invention refers to apparatus for extinguishing gas only. The clockwork mechanism is employed with the addition of a cam, which, at the desired hour, makes a half revolution, and operates a catch lever, which releases the stop-cock lever, and allows the same to be closed by a spring. When the gas is next lighted, the catch lever is connected with the stop-cock lever ready for the next operation of extinguishing.

Thirdly. The invention relates to a method of performing the operations of increasing or diminishing the flame described in the first part by means of electricity. Instead of removing the retaining catch by means of clock-

work, it is removed by means of a lever attached to the armature of an electro-magnet. When it is desired to put the apparatus into operation, it is only necessary to establish the electric current for an instant, so as to remove the retaining catch, which is replaced by a spring as soon as the wheel has made half a revolution, and the current is broken. The current may be established or broken either by hand or clockwork mechanism.

Fourthly. The invention relates to a method of extinguishing only by electricity. The catch lever governing the stop-cock is attached to the armature of the magnet, and is removed from the stop-cock when the current is established, and the cock is closed by a spring, as described in the second part.

3445.—SIEBERT, O., Lisle Street, London, "*Improvements in gaslight apparatus and arrangements connected therewith.*" Patent dated Aug. 30, 1878.

This invention consists mainly of the following arrangements:—For regulating the gas to the burner a screwed socket is arranged, provided with a seat, in the centre of which is a small opening; and above is the screw, into which screws the burner. The burner at the lower part is provided with a peculiarly shaped plug, so formed as to come to a point immediately over the opening in the seat, the sides being provided with openings so that the gas issuing from the opening in the seat passes up, around, and thence to the burner, the regulation being effected by turning the screwed piece, and with it the plug. This screwed piece is provided with a triangle or globe holder, each arm of which is grooved or recessed, and into the groove or recess a small spring is placed. The spring is covered by a piece of metal terminating in the clip for holding the globe, such clip being passed through an opening made in each arm, the upper portion being turned inwards to clip the rim of the globe, and the lower part forming a projection to draw or force the plate in or out to suit the size of the globe.

3462.—HERITAGE, J., Clapham, Surrey, "*Improvements in ball-valves.*" Provisional protection only obtained. Dated Aug. 31, 1878.

According to these improvements the ball-lever, where it is hinged to the valve-box, is formed with a cam-shaped projection in contact with the end of the valve-spindle. This operates in such a manner that upon the falling of the lever the projection forces the valve from its seat against the pressure of the water from the main; and when the ball-lever rises, the projection moves away from the spindle, and the pressure of the water from the main closes the valve.

3468.—GIROUD, H., Paris, "*Improvements in rheometric gas-burners.*" Patent dated Sept. 2, 1878.

This invention relates to the construction of gas-burners with which is combined a governor or rheometric apparatus for the purpose of regulating the flow of gas, notwithstanding variations of pressure in the supply. The governor may be either of the wet or dry kind, in the one case consisting of a light bell inverted like a gasholder in liquid; in the other, consisting of a light disc, free to rise or descend like a piston, within a cylindrical casing. In both cases the supply aperture to the burner above the bell or disc is governed by a conical valve or plug attached to the bell or disc, so as to the more throttle the aperture the greater the pressure causing the bell or disc to rise.

When the wet governor is used, the burner is made in several pieces, the lower piece presenting a cylindrical cavity in which the bell works, resting, when there is no pressure, on radiating ribs at the bottom of the cavity, and guided by side ribs so as to rise or descend evenly.

The lower cavity is covered by a cap screwed on, and having on its under side a diaphragm with a central hole in it, governed by the conical plug on the bell. The cap has one or more branch passages leading up from it to the burner, which may be of metal, steatite, or other suitable material. For the dry governor, the lower cavity is bored truly cylindrical, and closed at the bottom by a screwed cap.

In the cylindrical interior works the disc, which fits loosely so as to allow leakage of gas past its edge. The disc is made of aluminium for the sake of lightness, and secured by a boss of solder on each side of it to a stem that carries a valve governing the aperture above to the branch passages leading to the burner. From under the disc there is a lateral bye-pass for the gas by a passage governed by a screw-cap, which can be adjusted so as to let more or less gas pass to the upper side of the disc, according to the needs of the burner.

In constructing the rheometric burners above described, alloys of tin, lead, and antimony are employed for the casings; for the bell of the wet governor, an alloy of tin, with 5 to 10 per cent. of nickel, and with a little copper, tungsten, platinum, or palladium; and for the disc of the dry governor, aluminium—these metals and alloys not being chemically acted on by the gas.

3474.—GROTH, L. A., Stockholm, "*Improvements in the construction of gas-burners.*" A communication. Patent dated Sept. 2, 1878.

Burners made according to this invention consist of two main parts screwed into one another. The lower part contains a conical sleeve, the small open upper apex of which just enters a small hole formed in a partition above it. The cone sleeve can rise and fall according to the gas pressure. With medium gas pressure the gas lifts the cone sleeve so far that gas enters the hole in the partition, partly from the apex of the cone sleeve, and partly from the chamber in which it works; with high gas pressure, the cone sleeve being in its highest position, and its apex fully entering the hole in the partition, the gas enters the latter only, or mainly from the cone sleeve. When the pressure becomes lower, the cone sleeve sinks down until equilibrium is restored again. The cone sleeve will, by the gas pressure, rise until the pressure in the chamber around it, in addition to the weight of the cone sleeve itself, balances the inner gas pressure in it.

3488.—GEDGE, W. E., Wellington Street, Strand, "*Improvements in suspending and adjusting sliding gaseliers or gas apparatuses.*" A communication. Patent dated Sept. 3, 1878.

This invention relates to the application of a rack to the sliding tube of a gas pendant or gaselier, a pawl or catch arresting the descent at any desired point. In lieu of the pawl or catch, an endless screw gearing with a pinion may be employed. The pinion drives a toothed wheel, which in its turn gears with the rack of the tube, and, by means of a crank, the apparatus may be raised or lowered according to requirements.

3518.—MOLISON, A. R., Swansea, "*Improved electrical apparatus for igniting illuminating gas.*" Patent dated Sept. 5, 1878.

In these improvements a closed vessel is employed, containing the exciting liquid and the battery elements, the latter fitted to the cover thereof. The carbon is insulated from the cover, and a wire passes up through it, and through a tube attached thereto. In the upper end of the tube is a plug of insulating material, which receives a fine tube to which the wire from the carbon is attached. A similar fine tube is soldered to the plug tube, and the two are connected by a strip of platinum foil. Surrounding the plug is an outer tube open at the upper end, and terminating at its lower end in a flange. Pendent from the flange is a rod, which passes through the cover and connects with the zinc element. Surrounding the plug tube, and interposed between the cover and the flange of the outer tube, is a coiled spring, which serves, by pressing on the under side of the flange, to support the zinc element clear of the exciting liquid, and keep the outer tube raised above the platinum foil until the outer tube is depressed, when the zinc will be immersed in the exciting fluid, and an electrical action set up, the platinum being thereby heated, and igniting the gas.

3639.—PARKINSON, G. J., Balsall Heath, near Birmingham, "*Improvements in gas-burner regulators.*" Patent dated Sept. 16, 1878.

This invention consists in making in two pieces a shell or case, the lower part of which is screwed to connect it with the gas supply, and the upper part is screwed or otherwise fitted to receive a burner. In the lower part there is a fixed disc or seat with a small hole in the centre. Between the upper and lower parts there is a moveable disc of such size as to permit a sufficient quantity of gas to pass between its edge and the shell to supply the burner. The moveable disc has attached to its under part a long conical stem which serves as a valve when rising or falling through the hole or seat in the fixed disc. When the gas enters the regulator it passes through the hole in the fixed disc, and by its pressure raises the moveable disc until the long conical stem or valve closes the hole in the valve-seat below to such an extent as to admit of only sufficient gas passing as is necessary to produce the requisite pressure at the point of combustion. To prevent the possibility of the lights being put out by the moveable disc being suddenly forced up against the flange on the inside of the upper part of the case, notches are cut in it to allow of a passage for the gas.

3694.—WALLACE, R. W., Mark Lane, London, "*Improvements in the manufacture of sulphate of ammonia, and in apparatus therefor.*" Patent dated Sept. 19, 1878.

In carrying this invention into practice, a tank, preferably placed below the surface of the earth, contains the crude ammoniacal liquor, which is pumped up to a tower, passing in its course through a series of sulphuretted hydrogen condensers, by which it is heated. As the liquor descends within the tower, steam at a high pressure is admitted at the bottom, thereby causing the crude liquor to give off nearly the whole of the free ammonia gas, consisting of carbonate and sulphide of ammonia, which then passes off to the saturators. The remaining liquor is then carried, by means of a pipe provided at the lower part of the tower, to one or more blowers or tanks, to which steam is admitted. From these tanks the liquor is blown into the ordinary steam boilers through a connecting-pipe, where the remainder of the free ammonia is eliminated. From these boilers the liquor is afterwards blown off through another pipe to a tank containing lime, which is agitated by means of a perforated pipe connected with the steam-boilers. The fixed ammonia or sulphocyanide of ammonia left in the liquor is here eliminated, and is taken back to the tower through a pipe provided for the purpose, the pipe also serving as an overflow-pipe to prevent the tower from becoming too full, if there should be any obstruction in the pipe at the bottom. It is then taken away to a saturator or saturators, in which, by being combined with sulphuric acid, it becomes sulphate of ammonia.

The sulphuretted hydrogen generated in the saturators is passed through the condensers, which are constructed of wrought iron, and are provided with a number of small tubes arranged vertically. Within the surrounding space there is a continual flow of the crude ammoniacal liquor passing from the liquor tank to the tower. This liquor condenses, and at the same time is heated by the sulphuretted hydrogen passing through the vertical tubes, from whence the uncondensed sulphuretted hydrogen is conveyed to the boiler furnaces to be burnt. The spent lime in the agitating tank is blown off through pipes to a series of precipitating tanks.

According to another part of the invention, a considerable portion of the above-described apparatus is dispensed with, and within the tank containing the crude ammoniacal liquor is placed a pipe, connected with an air-pump, or with a gas-exhauster worked by a steam-engine, or in any other suitable manner. This air-pump or exhauster exhausts the air from the tank, and the liquor evaporates, giving off the free ammonia gas, which is led direct to the saturator, where it is treated in the usual manner. If necessary, the liquor may be heated by steam passing through a coiled pipe or otherwise to ensure the evaporation of the ammonia. The fixed ammonia is then eliminated, agitating with lime in the ordinary way.

3768.—LAKE, W. R., Southampton Buildings, London, "*Improvements in apparatus for the manufacture of gas.*" A communication. Patent dated Sept. 24, 1878.

This invention relates more particularly to that class of generators which produce fixed illuminating gas from liquid material, such as petroleum or other hydrocarbon oils; and it partly consists in the employment of one or more retorts provided with safety escape seals or valves upon the end or ends thereof, in combination with an external chamber enclosing the ends. Also in the peculiar combination of straight and curved retorts; and in certain details and combinations of parts in the internal construction of the retorts.

3915.—CUTLER, S., Millwall, "*Improvements in apparatus used in the manufacture of gas.*" Patent dated Oct. 4, 1878.

This invention has reference to the mouthpieces of gas-retorts, and has for its object the production of means for the prevention of undue strain upon the retorts, consequent upon the mouthpieces overhanging the retorts, the weight being ordinarily sustained simply by the bolts that connect the retorts and mouthpieces together.

The invention consists in fixing to the buckstaves a cast-iron bracket or brackets sufficiently long to reach a little beyond the centre of the bottom of the lowest and nearest retort. That part of the bracket immediately below the mouthpiece is made with two inclined planes, and between it and the mouthpiece are inserted two cast-iron blocks, the bottoms of which have also inclined planes. These blocks have each a hole through which a screwed bolt is passed, and upon turning the nut or head of the screw the blocks are brought together and made to take a bearing upon the bracket, and by virtue of their bottoms and the upper parts of the bracket having inclined surfaces, the two blocks as they approach rise and wedge themselves under the mouthpiece, thus relieving the strain upon the retort by affording another and independent support. Instead of a bracket, a pillar resting on the floor, and having its upper part fashioned in the manner before described, may be used to support the lowest retort, or the bracket may be extended from one buckstave to the next, so as to form a girder upon which projections with inclined surfaces may be formed, as before mentioned. The upper retorts are supported by saddles resting on the next lowest retorts, the saddles in some cases being connected together by bridge pieces. Each of the saddles, however, is made with a doubly inclined surface, so as to take the blocks and screw before mentioned, and conjointly render the needed support.

Instead of having the brackets made with two inclined surfaces, one only may be used, and in that case one block only will be needed in each bracket, the bolt being made to pass through both the bracket and block.

3925.—CARSON, W., Egremont, Chester, "*Improvements in and relating to the generation and application of illuminating hydrocarbon gases, and in apparatus connected therewith.*" Patent dated Oct. 5, 1878.

This invention consists, first, in the system of generating and applying illuminating hydrocarbon gas by means of the direct application of air under pressure superior to atmospheric pressure, the gas being supplied from porous material saturated with hydrocarbon spirit, and the pressure

of the air and the supply of the gas being regulated and equalized by the amount of consumption. Secondly, in the construction and arrangement of an aërometer, generator, and valves, and the combination of these parts forming an apparatus for the generation and supply of illuminating hydrocarbon gas. Thirdly, in the system of applying illuminating hydrocarbon gases by means of suction or induced draught applied to the burners supplied with gas from the gas apparatus.

3937.—LAKE, W. R., Southampton Buildings, London, "*Improvements in gaslight extinguishers.*" A communication. Patent dated Oct. 7, 1878.
These improvements relate to devices for extinguishing gaslights by changing the pressure of gas in the main-pipe, and the apparatus employed consists of two inverted cups of different sizes arranged upon a stem, one within the other, to operate corresponding cells containing quicksilver. The cups are raised by a lever pivoted to an enclosing case, with an inlet passage extending from the gas-pipe to the interior of one cup, and an outlet passage extending from the interior of the other cup to the burner, and they are so weighted as to be held up in a position with one cup out of the quicksilver, or dropped by a change of the gas pressure in the main-pipe into a position with both cups in the quicksilver.

3972.—WEATHERHOGG, G. W., Lambeth, London, "*Improvements in gas motor engines.*" Patent dated Oct. 9, 1878.
In a single-acting compound gas motor engine constructed according to this invention, the exploding materials, when ignited, give motion to one piston at the same time that fresh air and gas are drawn in behind a second piston, connected with the first within the same cylinder, the air and gas being compressed during the return stroke and afterwards transmitted to the back of the first-named piston ready for a subsequent explosion, so that an explosion may be made at every revolution of the engine. The cylinder is made of two diameters, and equal to double the length of the stroke, with pockets or reservoirs, and the pistons fit into each part of the cylinder, the larger piston forming a trunk in which the connecting-rod works. The latter piston also acts as an air-pump or compressor.

APPLICATIONS FOR LETTERS PATENT.

305.—KINGSFORD, C., Upper Clapton, London, "Improvements in apparatus for the generation of steam, the manufacture of coke and gas, and for similar purposes." Jan. 23, 1880.
330.—LINFORD, C., Leicester, "Improvements in and connected with gas-engines." Jan. 24, 1880.
332.—FIELDING, J. R., and BUTTERWORTH, B., Rochdale, Lancs, "Improvements in or applicable to gas burners or lights." Jan. 26, 1880.
343.—ABEL, C. D., Chancery Lane, London, "Improvements in gas motor engines." A communication. Jan. 26, 1880.
353.—SMITH, R., Edinburgh, "New or improved water supplying and regulating apparatus for water-closets and other analogous purposes." Jan. 27, 1880.
390.—BRADSHAW, J., and HAWORTH, J., Blackburn, Lancs, "Improvements in gas-lighting apparatus." Jan. 29, 1880.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

3148.—LOWRIE, R., Newcastle-on-Tyne, "An improved union joint or coupling for pipes and tubes." Aug. 5, 1879.
3177.—SILBER, A. M., Whitecross Street, London, "Improvements in gas-burners." Aug. 7, 1879.
3183.—CLELAND, W., Linacre, Lancs, "Improvements in means and apparatus used in the manufacture of gas from coal, cannel, shale, and like materials." Aug. 8, 1879.

Share List of Gas and Water Companies.

(*Corrected by Mr.* ARTHUR G. PRATER, 23, *Cornhill, from the latest Stock Exchange Quotations.*)

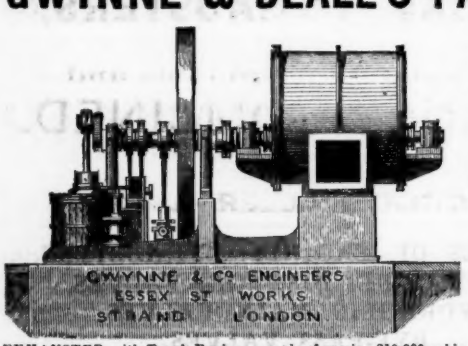
Number of Shares issued.	Amount per Share.	Name.	Amount paid up per Share.	Last Divd. p.Cent. p. Ann.	Latest Quotations.
	£	GAS COMPANIES.	£ s. d	£ s. d	£
589892	10	Alliance and Dublin	10 0 0	10 0 0	15⅜–16
10000	20	Anglo-Romano . .	20 0 0	10 0 0	21–23
5000	20	Bahia (Limited). .	20 0 0	4 0 0	12–13
1500	20	Do., 2nd pref. . .	20 0 0	7 10 0	20–22
40000	5	Bombay (Limited).	5 0 0	7 10 0	5⅜–6
10000	5	Do., fourth issue.	4 0 0	7 0 0	¼–¾ pm.
10000	10	Bournemouth . . .	10 0 0	8 0 0	13½–14½
229700	..	Brentford	100 0 0	9 0 0	148–53
..	..	Do., 5 per ct. pref.	100 0 0	5 0 0	95–100
..	20	Do., C shares . .	18 0 0	9 0 0	6–8 pm.
5400	20	Brighton	20 0 0	10 0 0	32–34
5000	20	Brighton and Hove	20 0 0	10 0 0	32–34
14000	20	British (Limited) .	20 0 0	10 0 0	33–35
7223	20	Cagliari (Limited).	20 0 0	6 10 0	16–18
1500	10	Colney Hatch . . .	10 0 0	5 0 0	9–10
5500C0/.	Sk.	Commercial	100 0 0	11 0 0	179–182
70000/.	Sk.	Do., 7 per cent. .	100 0 0	8 0 0	135–40
20000	20	Continental Union.	20 0 0	6 10 0	18–½
20000	20	Do., new	14 0 0	6 10 0	3-2 dis
10000	20	Do., preference .	20 0 0	7 0 0	22–23
75000/.	Sk.	Crystal Palace District	100 0 0	10 0 0	170–5
125000/.	Sk.	Do., 7 per cent. .	100 0 0	7 0 0	125–30
500000/.	Sk.	Do., preference .	100 0 0	6 0 0	118–123
25000	6	Do., ordinary 7 per cent. . . .	1 4 0	7 0 0	⅜–¾
7100	25	Edinburgh	25 0 0	10 0 0	46–48
23406	10	European (Limited)	10 0 0	10 10 0	18–20
12000	10	Do., new shares.	7 10 0	10 10 0	4–5 pm.
35406	10	Do., new shares .	5 0 0	10 10 0	2–3 pm
4096300/.	Sk.	Gaslight & Coke A.	100 0 0	10 10 0	178–80
1000000/.	Sk.	Do. B.	100 0 0	4 0 0	73–77
50000	10	Do. do., 5th do. .	10 0 0	5 0 0	16–16½
2000000/.	Sk.	Do. C 10 p.c. pref.	100 0 0	10 0 0	205–210
300000/.	,,	Do. D do. do. .	100 0 0	10 0 0	205–210
165000/.	,,	Do. E do. do. .	100 0 0	10 0 0	205–210
30000/.	,,	Do. F 5 do. do. .	100 0 0	5 0 0	101–4
600000/.	,,	Do. G 7½ do. do. .	100 0 0	7 10 0	150–156
1300000/	,,	Do. H	100 0 0	7 0 0	125–128

Number of Shares issued.	Amount per Share.	Name.	Amount paid up per Share.	Last Divd. p.Cent. p. Ann.	Latest Quotations.
	£	GAS COMPANIES.	£ s. d	£ s. d	£
6200	5	Georgetown, Guiana	5 0 0	7 0 0	4¼–4¾
300000	100	Glasgow Corporation Gas	100 0 0	9 0 0	205–210
115000	100	Do., do.	100 0 0	6 15 0	155–160
..	100	Grimsby Gas, A. .	100 0 0	..	188–190
..	10	Hampton Court . .	10 0 0	10 0 0	15–16
7800	10	Hong Kong (Lim.)	10 0 0	10 0 0	14½–15½
5000	10	Hornsey	10 0 0	10 0 0	15–16
20000/.	100	Imperl. Continental	100 0 0	10p.c.& 2 p.c.	178–180 bonus
..	..	Kingston	..	..	..
..	..	Lea Bridge	..	7 0 0	11¼–12½
56100/.	100	Liverpool United .	100 0 0	10 0 0	180–185
169100/.	100	Do., B	100 0 0	7 0 0	125–135
386500/.	Sk.	London	100 0 0	10 0 0	175–178
150000/.	Sk.	Do., 1st pref. . .	100 0 0	6 0 0	123–126
7622	25	Do., A shares . .	25 0 0	6 0 0	29–31
26692/.	Sk.	Do., Debent. stk.	100 0 0	5/. & 6/.	..
15000	5	Malta and Mediterranean (Limited).	5 0 0	2 10 0	1⅞–2⅛
6000	5	Do., preference .	5 0 0	7 10 0	5–5⅛
20000	5	Mauritius (Limited)	2 5 0	1 0 0	1¾–1¼ dis
25000	20	Monte Video (Lim.)	20 0 0	6 0 0	13¼–14
8000	10	Nietheroy, Brazil (Limited)	10 0 0	5 0 0	3¼–4¼
30000	5	Oriental (Calcutta).	5 0 0	9 0 0	6¼–7
30000	5	Do., new shares .	3 10 0	9 0 0	1–1¼pm
10000	5	Ottoman (Limited).	5 0 0	3 0 0	2–2¼
10000	10	Pará (Limited) . .	10 0 0	4 10 0	5¼–6
27000	20	Phœnix	20 0 0	10 0 0	35–37
360000/.	100	Do., new max. 7½	90 0 0	7 10 0	111–115
1440000/.	Sk.	Do., capitalized .	100 0 0	5 0 0	87–92
..	20	Do., new, 1876. .	16 0 0	10 0 0	14-15pm
..	10	Richmond (Surrey) (Limited)	10 0 0	10 0 0	16–17
37500	20	Rio de Janeiro	20 0 0	10 0 0	25–27
1500	32½	Shanghai	32 10 0	12 0 0	.. [pm
135000	100	Sheffield, A	100 0 0	10 0 0	197–198
99700	100	Do., C	100 0 0	10 0 0	195–197

Number of Shares issued.	Amount per Share.	Name.	Amount paid up per Share.	Last Divd. p.Cent. p. Ann.	Latest Quotations.
	£	GAS COMPANIES.	£ s. d	£ s. d	£
12500	5	Singapore (Lim.) .	5 0 0	7 10 0	5¾–6¼
2000	5	Do., preference.	5 0 0	7 10 0	5¾–6¼
500000	Sk.	South Metropoltn.	100 0 0	11 10 0	198–202
..		Do., "B"	100 0 0	10 0 0	180–185
..	5	Tottenham & Edmonton	5 0 0	10 0 0	8¼–8¾
1500	10	Wandsw. & Putney	10 0 0	10 0 0	14½–15
1500	10	Do.	10 0 0	7 10 0	12½–13½
4000	10	Do.	10 0 0	7 0 0	11½–12
26000	5	West Ham	5 0 0	10 0 0	8¼–9¼
..	10	West Kent	10 0 0	10 0 0	14–16
2100	5	Woolwich, Plmstd. and Charlton . .	5 0 0	16 0 0	9–10
		WATER COMPANIES.			
615600	100	Chelsea	100 0 0	6 10 0	198–202
1624700	100	East London . . .	100 0 0	6 10 0	208–210
10798	50	Grand Junction .	50 0 0	5 0 0	120–122
5840	25	Do., ¼ shares . .	25 0 0	5 0 0	59–61
6160	25	Do., new ditto; max. div.,7½ p.c.	25 0 0	5 0 0	47–50
5551805/.	100	Kent	100 0 0	8 0 0	283–288
7818005/.	100	Lambeth	100 0 0	6 10 0	208–211
3261505/.	100	Do.,max.,7½ p.c.	100 0 0	6 10 0	183–188
442	100	New River	100 0 0	10 3 8	320–350
4475	100	Do.	85 0 0	10 3 8	280–300
400000	100	Do.,deb.sk.,4p.c.	100 0 0	4 0 0	101–103
6668005/.	100	Southwrk & Vauxh.	100 0 0	6 0 0	208–211
3247005/.	100	Do., pref. stock.	100 0 0	5 0 0	127–129
1265005/.	100	Do., D shares. .	100 0 0	6 0 0	174–178
700005/.	100	Do., new ordnry.	..	4 10 0	..
1600	100	Do.,nw.ord.No.1	40 0 0	4 10 0	..
15073	61	West Middlesex .	61 0 0	6/. p.sh	182–185

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION, TWO MEDALS at the PHILADELPHIA EXHIBITION and TWO MEDALS at the PARIS EXHIBITION, have been AWARDED to GWYNNE & CO. for GAS-EXHAUSTERS, ENGINES, and PUMPS; Also 27 OTHER MEDALS AWARDED at all the GREAT INTERNATIONAL EXHIBITIONS.

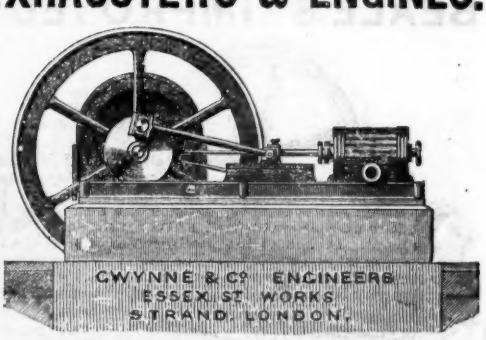
GWYNNE & BEALE'S PATENT GAS-EXHAUSTERS & ENGINES.



EXHAUSTER with Trunk Engine, capable of passing 210,000 cubic feet per hour.

The Judges report on the combined Exhauster and Steam-Engine exhibited at the Philadelphia Exhibition is—"*Reliable compact Machine, well adapted for the purpose intended, of excellent workmanship.*"

GWYNNE & CO. have made the largest and most perfect Gas-Exhausting Machinery in the world, and have completed Exhausters to the extent of 8,000,000 cubic feet passed per hour, of all sizes from 2000 to 210,000 cubic feet per hour.



52,500 EXHAUSTER, with Horizontal Engine combined.

GWYNNE & CO. do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, *but to produce machinery of the very highest quality, and most approved design and workmanship.* The result is that in every instance their work is giving the fullest satisfaction. Numerous testimonials and references can be given to Companies using their Machinery for years past.

Exhausters, with or without Engines combined, can be made to pass the gas WITHOUT OSCILLATION OR VARIATION IN PRESSURE Regulators, Bye-Passes, Stop-Valves, Gas-Valves, Station Governors, and Gas Machinery of all Sizes.

PLEASE ADDRESS IN FULL, GWYNNE & CO., Hydraulic and Gas Engineers, ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON, W.C., ENGLAND.

Gwynne & Co.'s New Catalogue on Gas-Exhausting and other Machinery may be obtained on application at the above Address.

WANTED, Readers of the NEW Edition, "Cooking & Heating by Gas;" on Burners, &c. Copies, by post, Threepence, direct from the Author, MAGNUS OHREN, Assoc.M.I.C.E., Gas-Works, SYDENHAM.

WANTED, at the Matlock Bridge Gas-Works, a Young Man as GAS-FITTER, and to Take and Attend to Meters, Service-Pipes, &c.
Apply to J. WINSON, Proprietor, Endcliffe House, BAKEWELL.

WANTED, by the Advertiser, aged 24, an appointment in a Gas-Works. Thoroughly understands Manufacture and Distribution, Retort-Setting, use of Photometer, Sulphur and Ammonia Tests, and general routine of office work. Fair draughtsman. Good writer. No objection to go abroad.
Address No. 622, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SOUTHEND GAS COMPANY.

WANTED, a Manager for the Gas-Works of the above Company. He must be well acquainted with the Manufacture and Distribution of Gas, Main and Service Laying, General Repairs, and the Taking of Meter Indices. Annual make 15 millions. The use of house, coal, and gas free.
Applications, enclosing testimonials and salary required, to be forwarded, not later than the 7th of February, to Mr. GEO. D. WATSON, Gas Company's Office, 11, Alexandra Street, Southend, ESSEX.

AN Experienced Engineering Draughtsman desires Engagement in Designing Gas-Works Extensions and Gas Apparatus renewals. Good testimonials.
Address No. 624, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

THE Local Board of Kirkby Lonsdale require the services of an Official to act as CLERK, Surveyor, Collector of Rates, and Inspector of Nuisances, and to perform all the duties appertaining to the business of the Board, to which he will have to devote the whole of his time. Salary £80 per annum. Population of the town, 1700.
Applications (in writing only), enclosing copies of testimonials, to be sent to the Chairman of the Board, Kirkby Lonsdale, on or before the 4th of February next.
J. BATEMAN, Clerk.

TAR TANK WANTED.

THE Richmond (Surrey) Gas Company require a New or Second-Hand Cast-Iron TAR TANK for Storing Tar. Capacity about 70,000 or 80,000 Gallons.
Particulars may be obtained from
JAMES ELDRIDGE, Manager.
Gas-Works, Richmond, Surrey, Jan. 26, 1880.

SLEAFORD GAS COMPANY, LIMITED.

FOR SALE—Single Gasholder, 32 ft. by 14 ft., Counter-balanced, Connections and all complete, in good condition. Reason for removal, ground wanted.
Particulars to be had of HARRY WIMHURST, Manager.

GAS COKE.

A LARGE QUANTITY required for delivery over a period of nine months.
Address, with price per ton into trucks at railway station, to G. J. EVESON, Gas, Coal, and Cannel Contractor, BIRMINGHAM.

TO GAS ENGINEERS.

THE Directors of the Sheffield United Gaslight Company require the services of a Resident ENGINEER. The requisite qualifications are a thorough Practical Knowledge of Engineering, Preparation of Plans, and Construction of Works; the Manufacture and Distribution of Gas; and of Chemistry as applied to its Manufacture and Purification; also of the Making of Sulphate of Ammonia.
Applications, not later than the 14th prox., to be addressed to the Chairman of the Company, stating qualifications, age, salary required, references, &c
Testimonials in the first instance are not required.
Offices, Commercial Street, Sheffield, Jan. 10, 1880.

THE GASLIGHT & COKE COMPANY.
Chief Office, Horseferry Road, Westminster, S.W., Jan. 27, 1880.
NOTICE is hereby given that a HALF-YEARLY ORDINARY GENERAL MEETING of the PROPRIETORS in this Company will be held at this Office, on FRIDAY, the 13th day of February next, at Twelve o'clock (noon) precisely, to transact the usual business, including the declaration of a Dividend for the half year ending the 31st day of December last; and to elect Directors and Auditors in the place of those who will at such meeting go out of office, in compliance with the Company's Acts or Schemes of Amalgamation.
By order,
JOHN ORWELL PHILLIPS, Secretary.

GASHOLDER—30 ft. by 14 ft.—for Sale; Contents 10,000 cubic feet. Also the Framing and Sheets of a similar Gasholder, taken down in large pieces Very suitable for roofing purposes.
Apply to the MANAGER of the St. Andrew's Gas Company, FIFE.

CHEMICAL WORKS TO LET.

THE Burnside Chemical Works, Ayr, for the Distillation of Gas, Tar, and Water. Manufacture of Sulphate of Ammonia, Naphtha, Oil, Pitch, Lampblack, &c.
The Works are very conveniently situated for communication by rail and sea.
Apply to JAMES CAMPBELL, Writer, SALTCOATS.

THURSO NEW GAS COMPANY.

TENDERS are invited for a quantity of 10 in., 6 in., 4 in., 3 in., and 2 in. GAS-MAINS for Lead Joints.
Parties tendering to state weight per yard and price per ton, delivered at Thurso, to ROBERT DEMPSTER, Gas Engineer, Rose Mount, ELLAND, on or before Tuesday, Feb. 10.

RAMSGATE IMPROVEMENT COMMISSIONERS—GAS AND WATER DEPARTMENT.

THE Gas and Water Committee invite TENDERS for the Erection of a COAL STORE, RETORT-HOUSE, &c., for which plans and specifications may be seen on application.
The Committee do not bind themselves to accept the lowest or any tender, which should be sent in not later than the 11th of February, addressed to the Chairman.
WILLIAM A. VALON, Engineer.

RAMSGATE IMPROVEMENT COMMISSIONERS—GAS AND WATER DEPARTMENT.

THE Gas and Water Committee invite TENDERS for Supplying and Fixing IRON ROOFS for Coal Store and Retort-House. Plans and specifications may be seen on application.
The Committee do not bind themselves to accept the lowest or any tender, which should be sent in not later than the 11th of February, addressed to the Chairman.
WILLIAM A. VALON, Engineer.

GARSTANG GAS COMPANY, LIMITED.

THE Directors of this Company are desirous of receiving Plans, Specifications, and Tenders for the Supply, Delivery, and Erection of the IRON WORKS required for about 1000 Lights. Further particulars may be obtained from the undersigned.
The Directors do not bind themselves to accept any plans or tenders.
JOHN NOBLE, Secretary.
Garstang, Jan. 23, 1880.

TENDERS FOR SULPHATE OF AMMONIA.

THE Directors of the Cork Gas Consumers Company are prepared to receive TENDERS for all the SULPHATE OF AMMONIA to be manufactured at their Works during the year 1880.
Delivery f.o.b. Cork.
Probable quantity, 100 tons. Payment, net cash on delivery. Prices to be fixed on basis of 24 per cent. Ammonia, and tenders to state whether packages are to be supplied free by sellers.
Tenders will be received up to Friday, Feb. 6, 1880.
By order,
DENNY LANE, Secretary.
Company's Offices, 72, South Mall, Cork, Jan. 17, 1880.

THE LONDON GASLIGHT COMPANY.
NOTICE is hereby given that an Extraordinary Special Meeting of the Proprietors of the London Gaslight Company will be held at the Offices of the Company, 26, Southampton Street, Strand, London, Middlesex, on Wednesday, Feb. 18, 1880, at Twelve o'clock at noon, for the purpose of considering and (if thought fit) approving of a Bill now pending in Parliament, intituled "A Bill to confer further powers upon the London Gaslight Company and for other purposes."
Dated this 19th day of January, 1880.
A. J. DOVE, Secretary.

TENDERS WANTED.

THE Forfar Gas Corporation is prepared to receive TENDERS for the Furnishing and Erection of Two PURIFIERS at the Gas-Works, Forfar, each of them 12 ft. square by 4 ft. deep, with suitable Valves, Connections, and Lifting Apparatus.
The plan and specifications will be seen in the hands of the Manager at the Works, and sealed tenders, marked "Tender for Purifiers," must be lodged with WILLIAM GORDON, Solicitor, FORFAR, Clerk to the said Corporation, on or before the 21st day of February, 1880.
The lowest or any tender may not be accepted.
Corporation Gas-Works, Forfar, Jan. 28, 1880.

TENDERS WANTED.

THE Forfar Gas Corporation is prepared to receive TENDERS for the following Works:—
First. The Furnishing and Erection at the Gas-Works, Forfar, of a Telescopic Gasholder, in Two Lifts, each 18 ft. deep—Outer Lift, 60 ft., and Inner Lift, 58 ft. 3 in. in diameter.
Second. The Converting of the present 60 ft. Single-Lift Gasholder into a Telescopic Gasholder of Two Lifts, the Inner Lift being 58 ft. 3 in. in diameter and 18 ft. deep.
The plans and specifications will be seen in the hands of the Manager at the Works, and sealed tenders, marked "Tender for Gasholders," must be lodged with Mr. WILLIAM GORDON, Solicitor, FORFAR, Clerk to the said Corporation, on or before the 21st day of February, 1880.
The lowest or any tender may not be accepted.
Corporation Gas-Works, Forfar, Jan. 28, 1880.

CORPORATION OF LEICESTER—GAS DEPARTMENT.

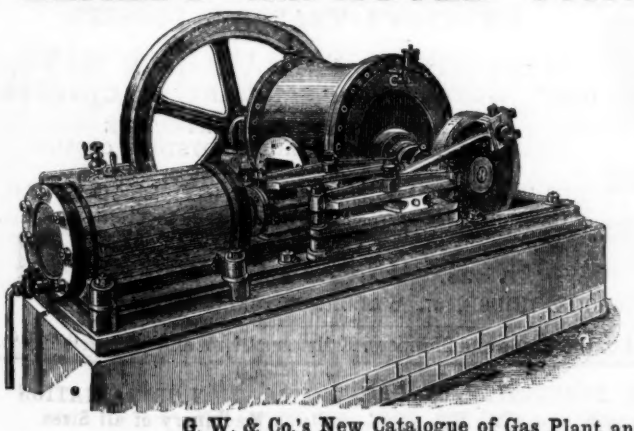
EXHIBITION OF GAS-ENGINES, COOKING-STOVES, BURNERS, AND OTHER APPARATUS.

THE Gas Committee of the Corporation of Leicester intend holding, from the 12th to the 17th of April next, an EXHIBITION of all kinds of Apparatus or Appliances showing the Advantages and Economical Uses of Gas for Engine, Cooking, Domestic, and other purposes. They will provide space, gas, and connections free, and give Certificates of Merit.
Intending Exhibitors will be furnished with printed conditions, forms for allotment of space, and any further information, on application to
G. A. AND C. S. ROBINSON, Managers.
Gas Offices, Millstone Lane, Jan. 23, 1880.

FROME LOCAL BOARD WATER-WORKS.

THE Frome Local Board require the Services of a PLUMBER, competent to Lay in the House Connections and Fittings on the constant service system.
Candidates are requested to apply by letter, in their own handwriting, stating age, wages required, &c., and when they could commence work. Testimonials as to competency and character are to be enclosed with the applications, which must be sent to the undersigned by 10 a.m. on Thursday, Feb. 5.
The Board invite TENDERS from parties willing to supply LEAD PIPE for the necessary House Connections and Fittings under high-pressure service.
The Board also invite TENDERS from Parties willing to contract for the supply of Wrought Iron Galvanized Steam Tubing, Brass Ferrules, Taps, &c., Waste-Water Preventing Cisterns, Meters, and all other Fittings pertaining to constant service.
The Regulations issued by the Board, with details as to currency of Tenders, quantities, and delivery may be had on application to me, to whom Tenders, &c., are to be sent in, not later than 10 a.m. on the 5th of February next, addressed to
G. W. BRADBURY,
Jan. 27, 1880. Clerk to the Local Board.

BEALE'S IMPROVED PATENT GAS EXHAUSTERS,



WITH
Wrought-Iron Spindles and
ENGINES COMBINED.

SOLE MAKERS,
GEORGE WALLER & CO.

MAKERS OF ENGINES, EXHAUSTERS, INDEX AND DISC GAS-VALVES, HYDRAULIC MAIN VALVES, BYE-PASS VALVES, TAR, LIQUOR, AND OTHER PUMPS, SCRUBBERS AND PURIFIERS, CONDENSERS, BOILERS, &c.

G. W. & Co.'s New Catalogue of Gas Plant and Machinery can be had on application.
[*SEE ALSO ADVERTISEMENT, PAGE* 186.]

Phœnix Engineering Works:
HOLLAND STREET, SOUTHWARK, S.E.

NOTICE TO MANAGERS OF GAS COMPANIES.

THE LAW UNION FIRE AND LIFE INSURANCE COMPANY, of No. 126, Chancery Lane, London, grants Policies of Insurance on Gas-Works, and Buildings connected therewith, which cover risk of explosion and spontaneous ignition of Coal, on very advantageous terms. Full particulars will be sent post free on application to

FRANK M'GEDY, Secretary.

126, Chancery Lane, London.

PORTSEA ISLAND GAS COMPANY.

THE Directors are desirous of receiving TENDERS for the following MOUTHPIECES, Tangye's patent, in good order and nearly new; taken down where West's system is now being adapted:—

Sixty 21 in. by 15 in. Oval on back to 18 in. Circular in front.

Ten 16 in. Circular.

Seventy 20 by 13 D's; all 15 in. deep from flange to face, with Sockets cast on for 6-in. Ascension-Pipes. Suitable for Beds of Sevens or Fives.

S. B. DARWIN, Secretary.

THE Directors of the Ludlow Union Gas Company are prepared to receive TENDERS for the Supply and Erection of a TELESCOPIC GASHOLDER, 50 ft. in diameter and 18 ft. deep, in accordance with the drawings and specification deposited with the Manager, at the Gas-Works, Ludlow.

Tenders to be sent in to the Secretary, Ludlow Union Gas Company, Ludlow, not later than Feb. 14, 1880.

Full particulars and information can be obtained on application to the Manager, Gas-Works, Ludlow.

The Directors do not bind themselves to accept the lowest or any tender.

CORPORATION OF BIRMINGHAM—GAS DEPARTMENT.

THE Gas Committee of the Corporation of Birmingham are prepared to receive TENDERS for the TAR to be produced at their various Works for a period of One, Three, or Seven years, from the 30th of June next.

The quantities produced in 1879 were as follows:—

Saltley Works.	8,500 Tons.
Windsor Street Works . . .	5,000 ,,
Adderley Street Works . . .	2,500 ,,
Swan Village Works. . . .	3,000 ,,
Total	19,000 Tons.

The Committee will receive tenders, either at a fixed price per ton, or at a price to be calculated on a sliding scale, varying with the selling price of products.

The Corporation are prepared to let on lease a portion of their surplus land, on which Tar Works could be erected.

Forms of tender may be obtained on application to me.

EDWIN SMITH, Secretary.

Old Square, Birmingham.

BOROUGH OF LIVERPOOL—WATER ENGINEER'S DEPARTMENT.

PRINCIPAL DRAUGHTSMAN WANTED.

MUST have had considerable experience as Engineering and General Draughtsman, and possess a good Knowledge of Pumping Machinery and Gravitation Works.

Preference will be given to one who has held a responsible position under a Water-Works Engineer. Age not to exceed 40. Salary £250 per annum.

Applications, with the names and addresses of present and former employers, to be sent in not later than Thursday, Feb. 5 next, addressed to the Water Engineer, Municipal Offices, Liverpool, and endorsed, "Application for Principal Draughtsman."

By order,

JOSEPH RAYNER, Town Clerk.

Municipal Offices, Liverpool.

A. FAIRLIE WILSON,

CONSULTING GAS ENGINEER,

34, ST. GEORGE'S ROAD, SOUTHWARK, S.E.

Reports and Valuations in the Management, Construction, and Structural Value of Gas-Works.

Now ready, price 18s., bound in cloth, gilt lettered,

THE THIRTY-FOURTH VOLUME

(JULY to DECEMBER, 1879,)

OF THE

JOURNAL OF GAS LIGHTING, WATER SUPPLY, AND SANITARY IMPROVEMENT.

CLOTH CASES, GILT LETTERED,

For binding Vol. XXXIV., may be obtained,

PRICE . . . 2s. 6d.

LONDON:

WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

IN THE PRESS.

THIRD EDITION, "Improvements in Gas Apparatus." By GEORGE ANDERSON.

With 22 Illustrations of Retorts, Purifiers, &c., &c.

Re-written and enlarged, with a chapter on the "Purification of Gas," by Mr. R. H. PATTERSON, late Metropolitan Gas Referee.

To be had of WALTER KING, "JOURNAL OF GAS LIGHTING" Office, 11, Bolt Court, FLEET STREET, E.C.; or of the Author, 35A, Great George Street, WESTMINSTER.

N.B.—Orders received before Feb. 14—when the type will be scattered—4s.

GAS PLANT FOR SALE.

THE Gas Committee of the Corporation of Birmingham have for Sale, at their Fazeley Street Works, which are now closed, the following PLANT, viz.:—

Mouthpieces, 206 D-shaped 18 in. by 13 in., with wrought-iron Lids and Cross Bars.

Mouthpieces, 26 D-shape, 16 in. by 12 in., with wrought-iron Lids and Cross Bars.

Also 27 15-in. Circular, fitted with Morton's Self-Sealing Lids and Holman's Fastenings, together with 4 in. and 5-in. Ascension, H, and Dip Pipes, and D-shaped Hydraulic Main, &c.

Battery Condenser.

Annular ,,

Cast-Iron Measuring Tank, 18 ft. by 13 ft. by 4 ft.

Cast-Iron Scrubbers, four 18 ft. by 4 ft. diameter, and one 24 ft. by 6 ft. diameter.

Six 16 ft. Square Purifiers, with Lifting Crane, 14 in. Connections, Valves, &c.

Two 8-horse power Vertical Engines.

One Cornish Boiler, 4 ft. 6 in. diameter by 16 ft., by Fernihough and Sons, of Dukinfield,

One Egg-ended Boiler, 3 ft. 6 in. diameter by 12 ft.

One 20,000 cubic feet per hour Jones's Exhauster.

One 50,000 ,, ,, ,,

One Hayward Tyler's "Special" Pump, with 4-in. Inlet and 5-in. Outlet.

One 40,000 cubic feet per hour Station-Meter.

One 20,000 ,, ,, ,,

One Cart-Weighing Machine.

12 in. and 14 in. Disc and Slide Valves, &c.

One 60-inch Letheby Photometer and Testing Apparatus.

Three Telescopic Gasholders, 62 ft. diameter by 34 ft. high.

Two 8-in. Governors.

For further particulars and to view, apply to Mr. CHARLES HUNT, Engineer, Gas-Works, Windsor Street, BIRMINGHAM.

THE Gloucester Gas Company, ceasing to manufacture gas at their old works, will have the undermentioned APPARATUS for Sale about the beginning of August, viz.:—

110 Mouthpieces, D-shape, 18 in. by 22 in., with Wrought-Iron Lids, Cross-Bars, Stand, Bridge, and Dip Pipes. Also about 150 feet of D-shape Wrought-Iron Hydraulic Main, size 19 in. by 19 in. 28 Mouthpieces, D-shape, 16 in. by 20 in., with Wrought-Iron Lids, Cross-Bars, Stand, Bridge, and Dip Pipes. Also about 38 ft. of D-shaped Wrought-Iron Hydraulic Main, size 20 in. by 20 in. Annular Condenser, consisting of six Vertical Pipes, 24 in. diameter, 19 ft. high, with three 12 in. Slide-Valves and 12 in. Connections.

Scrubber (round), 5 ft. by 20 ft., with three 12-in. Slide-Valves, and 12 in. Connections.

Exhauster (Jones) to pass about 15,000 feet per hour.

Exhauster (Beales) to pass about 25,000 feet per hour.

Two Vertical Steam-Engines, each about 6-horse power, with Pulleys, and Shafting used for driving the above.

Boiler 14 ft. 6 in. by 3 ft. 6 in., with Centre Tube, and four Galloway Patent Tubes.

4-horse power Horizontal Steam-Engine.

Three 4-in. Pumps, with cranked Shafting and a pair Mitre Wheels.

Set of four Purifiers, 12 ft. by 12 ft. by 4 ft., with 12-in. Centre-Valve (Cockeys), and Connections and Lift complete.

Station-Meter by A. Wright and Co., London, with three 12-in. Slide-Valves, and 12-in. Bye-Pass and Connections, to pass about 25,000 feet per hour.

Gasholder, Double Lift, with Cast-Iron Tank, capacity 37,000 feet.

Gasholder, Double Lift, capacity 100,000 feet.

Gasholder, Double Lift, capacity 240,000 feet.

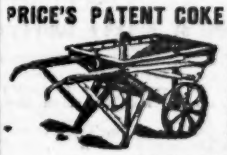
Two 12-in. Governors, by Wright, London, with 12-in Valves, Bye-Pass, and Connections.

Two 12-in. four-way faced Valves, by Cockey.

For further information, &c., apply to the undersigned.

R. MORLAND, Engineer.

PRICE'S PATENT COKE & COAL BARROW



effecting a great saving of time, labour, and expense.

For particulars, price, &c., apply to Mr. E. PRICE, Inventor and Patentee, Gas-Works, Hampton Wick, MIDDLESEX.

Prices are Reduced.

JAMES MILNE & SON,

GAS ENGINEERS,

Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,

EDINBURGH, AND

2, KING EDWARD STREET,

NEWGATE STREET, LONDON.

STATION-METERS GOVERNORS, CONSUMERS METERS, GAS LUSTRES, CHANDELIERS, BRACKETS, &c.,

And every description of Gas-Fittings and Gas Apparatus.

Now ready, Second Edition, price 7s., by post 7s. 3d., the

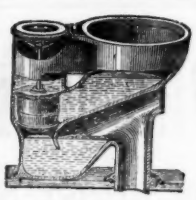
GAS MANAGER'S HANDBOOK.

By THOMAS NEWBIGGING, M.I.C.E.

Orders to be sent to

WALTER KING,

11, BOLT COURT, FLEET STREET, LONDON, E.C.



SMEATON'S TRAPLESS CLOSETS.

MESSRS. W. SMEATON & SONS,

HOT WATER AND SANITARY ENGINEERS.

PATENTEES AND INVENTORS OF THE TRAPLESS, THE D TRAP, AND EDDYSTONE CLOSETS.

Also the New

ECLIPSE COMBINATION CAST LEAD TRAP.

The Price will be half of the old-fashioned D Trap, it being cast all in lead, without a Joint. Send at once for an Illustrated Price List to their Wholesale and Retail Agent,

G. R. GLENIE,

WALBROOK HOUSE, 37, WALBROOK, LONDON, E.C.

A large Discount to the Trade and Shippers. Estimates Given and Contracts Taken.

ECONOMY IN THE PRODUCTION OF GAS.

PLUTONIC CEMENT,

FOR JOINTING AND REPAIRING RETORTS AND OVENS *in* ACTION AND *out* OF ACTION.

A Pamphlet on the advantages of the above, with Modes of Application, References, Prices, &c., free by post, from the Sole Manufacturer,

WILLIAM RICHARDSON, Gas and Hydraulic Engineer, CHARLES HENRY STREET, and BISSELL STREET, BIRMINGHAM.

R. DEMPSTER AND SON'S
WOOD SIEVES FOR PURIFIERS,

WITH TAPER OR PARALLEL BARS,

MADE BY SPECIAL MACHINERY.

SCRUBBERS FILLED WITH BOARDS,

On our approved principle, for the extraction of Ammonia.

Prices on application. References to First-Class Engineers.

ROSE MOUNT IRON-WORKS,

ELLAND, Near HALIFAX.

London Offices: 2, SUFFOLK LANE, CANNON STREET, E.C.

THE

IMPERIAL METER CO.,

LIMITED,

Makers of THE IMPROVED DRY GAS-METERS, THE PATENT WET GAS-METERS, Special Meters for Public Lighting, STATION-METERS, Governors, &c.

KING'S ROAD, ST. PANCRAS.

Formerly also (Walter Ford) at Gray's Inn Road.

THOMAS CARR & SON,

MANUFACTURERS OF

FIRE-BRICKS, LUMPS, TILES, RETORTS, &c.,

COTSWOOD FIRE-BRICK WORKS, SCOTSWOOD-ON-TYNE.

Also Makers of all kinds of Common Building Bricks, and of Pressed White and Red Bricks for Facing.

HYDRATED PURIFYING MATERIAL.

Samples on application.

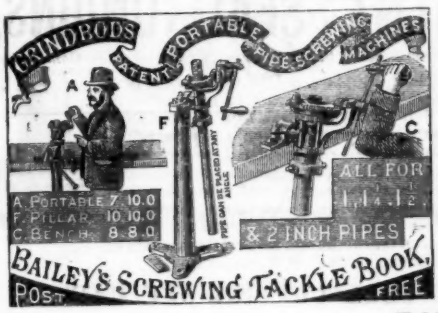
MESSRS. SPENCE BROS., LIMITED,

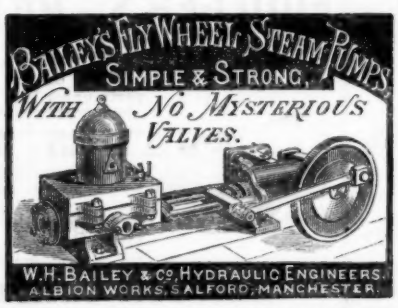
Will be glad to supply the above on the most favourable terms, and to treat, by Purchase or Exchange, for Spent Oxide.

PRICES ON APPLICATION.

ALSO PATENT DRY COPPERAS FOR EXTRACTING AMMONIA.

VICTORIA CHEMICAL WORKS, BRADFORD, NEAR MANCHESTER.




BAILEY'S FLY WHEEL STEAM PUMPS.
SIMPLE & STRONG.
WITH NO MYSTERIOUS VALVES.
W. H. BAILEY & Co. HYDRAULIC ENGINEERS.
ALBION WORKS, SALFORD, MANCHESTER.

Prices of Bailey's Double-Acting Steam-Pumps.

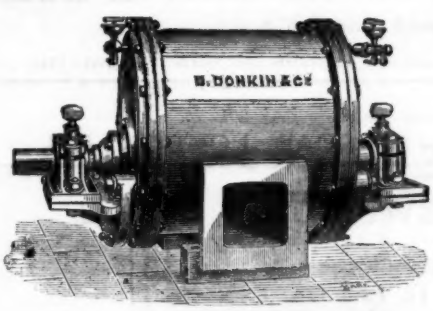
No.	Diameter of Steam Cylinder.	Diameter of Pump.	Length of Stroke.	Gallons pr. Hour. Approx.	Price.
	Inches.	Inches.	Inches.	At Slow Speed.	£
A 1	4	2	6	850	18
B 2	6	3	10	1,940	25
C 3	6	4	10	2,000	30
D 4	8	4	10	3,150	40
E 5	6	6	10	7,200	40
F 6	8	6	10	7,200	50
G 7	10	6	12	7,200	60
H 8	8	8	10	14,000	65
I 9	10	8	12	14,000	75
K 10	12	8	15	14,600	90
	10	10	15	21,000	110
	12	10	15	21,000	125

NOTE.—*At quick speed these pumps will generally deliver double the quantity specified.*

BAILEY'S HOT-AIR ENGINES,

From ¼-horse to 4-horse Power. Particulars on application. We also make Hot-Air Pumping Engines, and every description of Hydraulic Work.

W. H. BAILEY CO., ALBION WORKS, SALFORD, MANCHESTER.



NEW PATENT GAS-EXHAUSTERS.

[J. BEALE'S.]

Messrs. B. DONKIN & Co. possess the sole right to manufacture these Exhausters.

MADE WITH TWO OUTSIDE BEARINGS AND LATEST IMPROVEMENTS.

ALSO MANUFACTURERS OF

IMPROVED GAS AND WATER VALVES, STEAM-ENGINES, &c., &c.

B. DONKIN & Co., BERMONDSEY, LONDON.

THE

GAS & WATER ENGINEERS BOOK OF REFERENCE.

BY

GEO. BOWER, ST. NEOTS, HUNTINGDONSHIRE.

SECOND EDITION.

The first Edition of the *Gas Engineers Book of Reference* was published fourteen years ago, and it has long since been out of print. The present Edition has been almost entirely re-written, and it may be considered a business Treatise on Practical Gas Engineering, and there is, besides, a section devoted to Heating by Hot Water Circulation.

There are articles upon each branch of Gas Manufacture, together with Specifications, Memoranda, Rules, and Information useful to Engineers.

Price of the Book, 4s.; of the Companion, with Detailed Costs, 1s.

FREE POST IN ENGLAND ON RECEIPT OF P.O.O.

S. PONTIFEX & CO.,
GAS AND WATER ENGINEERS,

22, COLEMAN STREET, LONDON, E.C.,

Supply and Erect Street Lamp Columns, together with Head Irons and Lanterns, as well as all the other fittings connected therewith.

S. P. & Co. also contract with Gas, Railway, and other Companies, Local Boards, and Vestries, for the maintenance and repair of Lamps and Fittings.

BELGIAN CLAY RETORTS.

J. SUGG and CO., late ALBERT KELLER, GHENT.—The removal of the import duties on Earthenware permitting the entry of Clay Retorts into England, Messrs. Sugg, of Ghent, beg to draw the attention of the Gas Companies of London, and other Cities, to the very superior quality of the RETORTS manufactured by them. They can be made of any size, in one piece, and of any form. The price will be in proportion to the weight, and very moderate in comparison to their value.

Communications addressed to J. SUGG & Co., GHENT, will receive immediate attention.

JAMES NEWTON & SONS,
(Established 1820,)
FIRE-BRICK AND TILE MERCHANTS,
Wholesale and for Exportation,
FALCON DOCK, 78 AND 79, BANKSIDE,
SOUTHWARK, LONDON, S.E.,
DEPÔT for STOURBRIDGE AND NEWCASTLE FIRE-BRICKS, LUMPS, TILES, and FIRE-CLAY,
and every Article suitable for
GAS AND WATER WORKS.

TO GAS COMPANIES.

GEORGE McKAIG,
MANUFACTURER OF
GAS-PURIFYING WOOD SIEVES,
153, CLEVELAND STREET,
DONCASTER.

It requires but one trial to prove the Superior Make, Strength, and Durability of these Sieves.

CARRIAGE PAID.

TUBES

TUBES AND FITTINGS
For Gas, Steam, and Water, Galvanized, Enamelled, or Coated by Dr. Angus Smith's Patent Process.
Gas-Fitters' Tools, Brass & Copper Work, Socket-Pipes, Roofing, and all Kinds of Ironwork for Gas and Water Works.
JOHN SPENCER,
VULCAN TUBE-WORKS,
WEST BROMWICH, STAFFORDSHIRE.
LONDON OFFICE:
97, CANNON STREET, E.C.
J. E. & S. SPENCER, Agents.

JOHN ROMANS, C.E., F.G.S.E.,
CONSULTING GAS ENGINEER
AND
CANNEL COAL FACTOR,
30, St. Andrew Square, EDINBURGH.

Plans and Estimates furnished; Gas-Works, Apparatus, Pipes, Machinery, Fire Goods, &c., supplied, or Attested and Shipped for Exportation.

GAS-WORKS TAKEN ON LEASE.

Mr. ROMANS has for upwards of 30 years been practically engaged in the Manufacture of Gas, and has, by extensive experiments, ascertained that by JUDICIOUS INTERMIXTURE of the lighter with the heavier gases, much of the rich Hydrocarbons CAN BE SAVED, which otherwise ARE LOST, during the process of manufacture. He is therefore enabled to give advice to those who favour him with their orders for Cannel, as to the class which will secure for their standard of illuminating power the HIGHEST ADVANTAGEOUS RESULTS.

ANALYSIS AND PRICES FORWARDED ON APPLICATION.

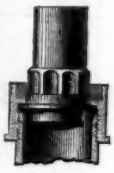
GEORGE ORME & CO.,
ATLAS METER-WORKS, OLDHAM,
MANUFACTURERS OF
WET AND DRY GAS-METERS,
STATION-METERS, GOVERNORS,
PRESSURE AND EXHAUST REGISTERS,
LAMP-METERS IN CAST-IRON BOXES,
And every Description of Gas Apparatus.

LONDONDERRY GAS COALS
DIRECT FROM THE
MARQUESS OF LONDONDERRY'S COLLIERIES.
COUNTY OF DURHAM.
For Prices and Particulars, apply to
MR. S. J. DITCHFIELD,
LONDONDERRY OFFICES, SEAHAM HARBOUR, COUNTY OF DURHAM.
London Agents: Messrs. LAMBERT BROS., 85, GRACECHURCH ST., E.C.

W. PARKINSON & CO.,
SOLE AGENTS FOR AND MANUFACTURERS OF
FOULGER'S PATENT SEAL UNIONS,
As Supplied to The Gaslight and Coke, Commercial, South Metropolitan, and other Companies.

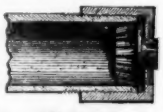
These Unions practically place a Gas Company's property under lock and key, by rendering it impossible to disconnect at any joint at which gas can be obtained unregistered, without destroying the Company's Seal.

In fixing the Union (one being required on the main cock and another on the inlet only), some molten sealing-wax is poured into the recess on cap, and whilst hot impressed with Foulger's patent tong-shaped die, having the Gas Company's title engraved thereon; the wax being forced into the flutings on the lining, instant destruction of the Seal accompanies any attempt at disconnection.


SECTION.

FOULGER'S PATENT SEAL CUTTING-OFF CAPS

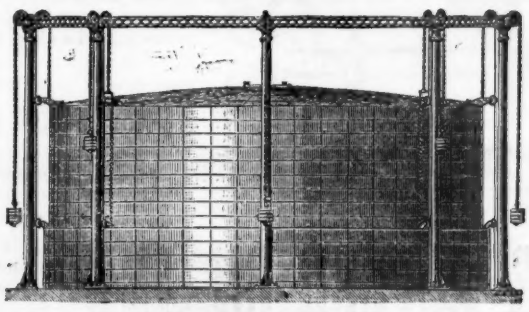
Cannot be taken off without destroying the Company's Seal. A tapered fluted plug (having been white-leaded or puttied) is inserted in the service-pipe. The cap (already filled with sealing-wax) is then screwed over, and tightens on a washer on the flange of plug. The wax is then warmed, and stamped with the engraved die. Absolute security against fraud and escape is thus obtained.


SECTION.

A great advantage will also be recognized in stopping the gas instantly with the plug, and consequent immunity from the present source of danger occasioned by escape during fitting the ordinary cap, frequently in a confined position, and often occupying a considerable time.

Small additional cost over existing connections.

COTTAGE LANE, CITY ROAD, LONDON, E.C.



J. T. B. PORTER & CO.,
GAS ENGINEERS & MANUFACTURERS,
IRONFOUNDERS AND CONTRACTORS,
GOWTS BRIDGE WORKS,
LINCOLN.

LONDON OFFICES: 1, WESTMINSTER CHAMBERS, S.W.

ESTIMATES FOR GAS-WORKS OF ANY SIZE.
REFERENCES TO 500 WORKS ALREADY ERECTED.

N.B.—All Communications to be addressed to the FIRM ONLY.

EDWARD BROOKE AND SONS,

FIELDHOUSE FIRE-CLAY WORKS, HUDDERSFIELD,

MANUFACTURERS OF

GAS-RETORTS, FIRE-BRICKS, &c.,

Which have been extensively used for 30 years in the construction of Glass Furnaces, where the heat is five times greater than in Gas Ovens; superior to any Retorts or Fire-bricks in the market for standing intense heats, and not contracting.

JOHN HALL AND CO., STOURBRIDGE,

Manufacturers of FIRE-BRICKS, LUMPS, TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

J. & H. ROBUS,

BUILDERS AND CONTRACTORS

FOR THE ERECTION AND REBUILDING OF GAS AND WATER WORKS,

RETORT-SETTING—A SPÉCIALITÉ.

ROBUS'S IMPROVED RETORT-SETTINGS, guaranteed to Carbonize a large amount of Coal with a small per cent. of Fuel.

ESTIMATES GIVEN FOR MAIN-LAYING.

N.B.—All kinds of Fire Goods and Gas Apparatus supplied on the shortest notice.

Address:—J. & H. ROBUS, BELL GREEN, CATFORD, LONDON, S.E.

J. & J. BRADDOCK,

GLOBE METER-WORKS, OLDHAM,

MANUFACTURERS OF

WET AND DRY CONSUMERS GAS-METERS,

OF THE HIGHEST EXCELLENCE ONLY;

ROUND STATION-METERS,

ON CAST-IRON STANDS;

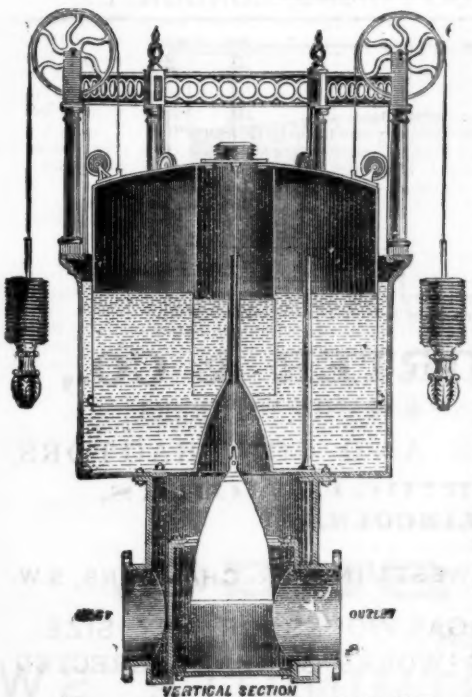
SQUARE STATION-METERS,

WITH PLANED JOINTS.

Messrs. Braddock beg to submit to Gas Engineers their

PATENT COMPENSATING GAS GOVERNOR,

Which is designed to give an uniform pressure at the Outlet to the Main at all draughts up to the full quantities which the Governors are made to control, such outlet pressure being less than the initial pressure.



The uniformity of pressure is obtained by introducing a compensating chamber into the Bell or Holder of the Governor, which compensator is of the same area as the valve, both of which are operated on by the initial pressure, thereby placing the valve in equilibrium, no matter what the initial pressure may be. The action on the Bell is by the Gas passing along a pipe from the outlet, and the pressure is regulated by weights in connexion with the Bell as required.

From the sectional elevation attached hereto, it will be seen that only the Gas required to operate the Bell comes in contact with the water of the tank, which water will remain comparatively sweet and free from odour. That in case of accident to the Bell, no more Gas can escape than would pass up the pipe covering the valve-rod and Bell supply-pipe.

These Governors have been made and sent out of various sizes for from 2 to 30-inch Mains, and give most satisfactory results.

They can be made with Float in the Bell, or counterpoise as per section.

C. & W. WALKER'S

WOOD PURIFIER SIEVES,

Which have now been used for fifteen years, and their advantages and durability fully established. They are made entirely by steam machinery in very large quantities at the most moderate cost.

MIDLAND IRON-WORKS,
DONNINGTON, Near NEWPORT, SHROPSHIRE.
FINSBURY CIRCUS, LONDON.

TROTTER, HAINES, & CORBETT,

BRETTELL'S ESTATE

FIRE CLAY & BRICK WORKS,

STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASS-HOUSE FURNACE & BLAST-FURNACE BRICKS LUMPS, TILES, and every description of FIRE-BRICK.

Proprietors of

BEST GLASS-HOUSE POT and CRUCIBLE CLAYS.

Shipments Promptly and Carefully Executed.

ESTABLISHED IN 1860.

BENJAMIN CARPENTER,

THE ORIGINAL MANUFACTURER OF THE IMPROVED

WOOD SIEVES

FOR

GAS PURIFIERS & SCRUBBERS.

PROVIDENCE WORKS,
22, HERMES STREET, PENTONVILLE ROAD,
LONDON, N.

The Dunston Engine Works Co.,

GATESHEAD-UPON-TYNE.

Are the Sole Manufacturers of

Archer's Patent Hoists,

ALSO OF

Archer's Patent Stone Breaker,

AND OF

Archer's Patent Ore Crusher & Pulveriser,

The last-named Machine (without the Pulveriser) makes the best and most durable Coke Breaker.

Less Heat, No Smoke,

White Light, & Economy

SPECKSTEIN & LAVA

Gas-Burner Fabricants

On the most approved French and German principles. These Burners can be made to consume from 1¼ feet to 20 feet of gas per hour, and to give a light from 4 to 150 candle power.

Terms and Discount on application.

Catalogue, 6d. Sample Burner, 1s.

Augustus Westwood & Co.,
Commercial Chambers,
West Bromwich.

"TANNIC GELATINE,"

FOR

REMOVING AND PREVENTING INCRUSTATION OF EVERY DESCRIPTION OF STEAM BOILERS: ALSO CORROSION.

Manufactured only by

WILLIAM RICHARDSON,

GAS ENGINEER,

94, CHARLES HENRY STREET, BIRMINGHAM.

Gold Medal Awarded, Paris Exhibition, 1878.

THOMAS TURTON AND SONS,

SHEAF AND SPRING WORKS,

SHEFFIELD,

MANUFACTURERS OF

FILES OF BEST QUALITY

FOR ENGINEERS,

STEEL OF ALL DESCRIPTIONS,

SCREW STOCKS, TAPS, AND DIES, SPANNERS, RATCHET BRACES, LIFTING-JACKS, ANVILS, VICES, AND ENGINEERS TOOLS GENERALLY.

LONDON OFFICE:

90, CANNON STREET E.C.

WILLIAM SUGG'S
IMPROVED SYSTEM OF STREET LIGHTING,

SUITABLE FOR EITHER COMMON OR CANNEL GAS.

Results obtained in Illuminating Power from WILLIAM SUGG'S 200-candle Burners with Cannel and Common Gas:—

Variety of Gas.	Cubic Feet of Gas burnt per Hour.	Illuminating Power in Sperm Candles burning 120 Grains per Hour.	Number of Candles to which every Cubic Foot of Gas burnt is equivalent.
Common 16-candle	53·4	228	4·25
Cannel 19-candle .	47·3	252	4·76

Joint experiment by—

CHARLES HEISCH, Superintending Gas Examiner to the Corporation of London.

T. N. KIRKHAM, M.I.C.E., F.C.S.

C. MEYMOTT TIDY, M.A., M.B., Professor of Chemistry and of Forensic Medicine at the London Hospital, Medical Officer of Health for Islington, and late Deputy Medical Officer of Health for the City of London.

The Illuminating power of the gas made by this Company, on the 9th inst., was 22·7 standard sperm candles for a consumption of 5 cubic feet per hour, in a Sugg's No. 7 steatite bat's-wing burner. On the same day the following results were obtained from two of Sugg's large new Argand burners:—

FIRST EXPERIMENT.

Burner: Sugg's Argand, with two concentric flames.

Consumption per hour . . . . . 22·2 cubic feet.
Illuminating power . . . . . 103·7 candles.
or 4·67 candles per foot of gas.

SECOND EXPERIMENT.

Burner: Sugg's Argand, with three concentric flames.

Consumption per hour . . . . . 40·8 cubic feet.
Illuminating power. . . . . 208·8 candles.
or 5·12 candles per foot of gas.

I have reason to believe that these are as high, if not the highest results yet obtained per foot of gas from these burners.

(Signed) WILLIAM KING,
Liverpool United Gaslight Company,
Liverpool, April 16, 1879. Engineer's Office, Duke Street.

[See JOURNAL OF GAS LIGHTING, April 22, 1879.]

Sugg's 200-candle burner, with 42·09 cubic feet of 20·85-candle gas, gave an illuminating power of 231·56 candles.
Same quality of gas as used at Westminster Bridge, and Waterloo Place, Regent Street.

(Signed) A. C. M'MINN,
Engineer to The Gaslight and Coke Company,
June 16, 1879. Kensal Green Station.

SUGG'S ARGAND, WITH THREE CONCENTRIC RINGS.

Illuminating Power of Gas.	Standard of Comparison.	Gas Consumed per Hour.	Illuminating Power.	Illuminating Power per Cubic Foot.
		Cubic Feet.		
21 candles .	5-ft. London	45	220·5	4·9
	burner . .	43	210·0	4·88

(Signed) J. R. FRITH,
Engineer, Runcorn Gas Company.

The following have been selected from a number of similar letters recently received:—

Reading, Nov. 12, 1879.

Your 200-candle Burner with Shadowless Lamp, erected here some months since, in the centre of four cross-roads, continues to give the greatest satisfaction, both to the public authorities and to this Company.
Before the Lamp was erected, several tests were made as to the real cost per hour (once in the presence of the Medical Officer of Health, Dr. Shea, who is the Gas Examiner for Reading), and from an average of these tests, we found that the best rate of consumption was at 52 feet per hour, and we had not the slightest reason to doubt that the Burner gave considerably over 200-candle power. I need scarcely refer to the beauty of the light, and while such street lighting can be effected at so small a cost, there is not much fear of electricity taking its place.

(Signed) EDWARD BAKER,
Engineer and Manager,
Reading Gas Company.

Dublin, Oct. 31, 1879.

In reply to your inquiry, I beg to say that your new reflecting Street-Lamps, which we have erected in Sackville Street, are giving the greatest satisfaction. They are greatly admired not alone for their beauty, but also in consequence of the Argand burner emitting a soft light, which is reflected with an entire absence of shadow. I have calculated that each of these lamps gives as much light as eight of the ordinary Street-Lamps.

(Signed) W. F. COTTON,
Secretary and Manager,
Dublin Alliance Gas Company.

Salford, Oct. 28, 1879.

In answer to your inquiry, I may state that we have three of your large Burners and Lanterns in use in Salford, each of which consumes 48 feet of gas per hour, and yields a light equal to 230 sperm candles. This is equal to 4·9 candles for every foot of gas consumed, *a larger amount of light than yielded by any other Burner.* An important point is that the Lanterns are so constructed that there is an entire absence of shadow.

(Signed) SAMUEL HUNTER, Assoc. I.C.E.
Engineer and Manager,
Salford Corporation Gas-Works.

Keighley, Oct. 31, 1879.

Our Committee being desirous of lighting certain positions in the town in a more effectual manner, requested me to fix one of your 200-candle Burners and improved Lanterns . . . . the object being to test the relative efficiency of different systems. The lamps were erected a few weeks since, when yours conveyed at once more favourable impressions. . . . Since that I have made a number of tests, and the favourable impressions yours made have been more than realized.
I may say that our Committee are so satisfied with your system that they have decided, when such lights are required, to adopt yours.

(Signed) JOHN LAYCOCK,
Engineer and Manager,
Keighley Gas-Works.

Blackburn, Nov. 27, 1879.

I have much pleasure in saying that for brilliancy and style I have never seen anything to equal your lamps. We have twelve 50-candle burners, two 80-candle, and one 200-candle in use, and after the Lamp Committee had inspected them, they were so highly pleased that they have resolved to erect similar lamps in all the public squares and crossings.

(Signed) S. R. OGDEN,
Engineer and Manager,
Blackburn Corporation Gas-Works.

PRICES AND PARTICULARS ON APPLICATION TO

WILLIAM SUGG,

GAS ENGINEER,

VINCENT WORKS, WESTMINSTER, S.W.

F. & C. OSLER,

45, OXFORD STREET, LONDON, W.

MANUFACTORY AND SHOW-ROOMS:

BROAD STREET, BIRMINGHAM.

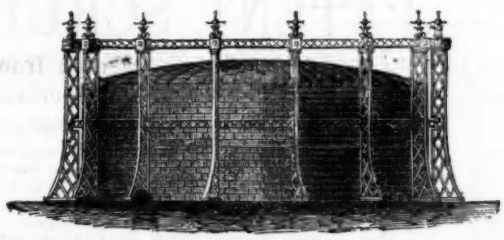
ESTABLISHED 1807.

MANUFACTURERS OF CRYSTAL GLASS CHANDELIERS,

WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES.

TABLE GLASS OF ALL KINDS.

CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.



THE HORSELEY COMPANY,

LIMITED,

TIPTON, STAFFORDSHIRE.

LONDON OFFICE:

6, WESTMINSTER CHAMBERS, VICTORIA STREET,

GAS ENGINEERS, IRONFOUNDERS, &c.,

MANUFACTURERS OF

GASHOLDERS, WROUGHT AND CAST IRON TANKS, CONDENSERS, PURIFIERS, SCRUBBERS, MAINS, RETORT-LIDS, PLAIN AND DISHED, LAMP-POSTS, PIPES,

AND ALL REQUISITES FOR EITHER

GAS OR WATER WORKS;

ALSO

MAKERS OF ROOFS, BRIDGES, &c.

S. OWENS & CO.,

WHITEFRIARS STREET, FLEET STREET, LONDON, E.C.,

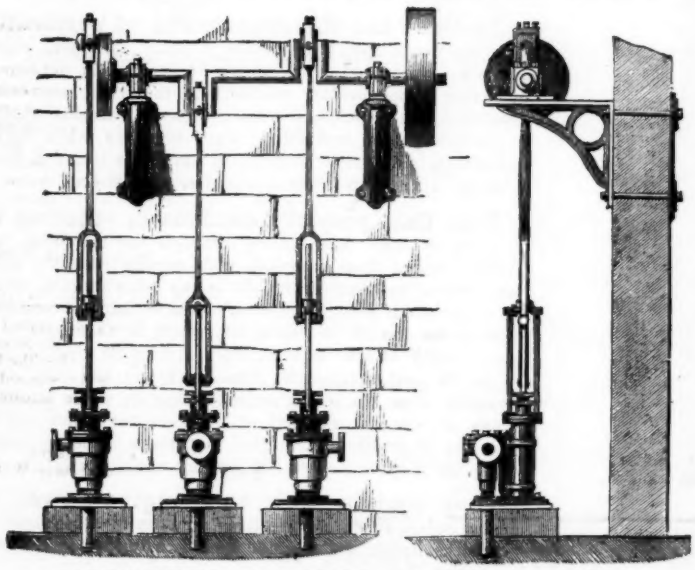
Hydraulic Engineers,

AND MANUFACTURERS OF

PUMPING MACHINERY of every Description.

SOLE LICENSEES AND MANUFACTURERS FOR GREAT BRITAIN OF

BLAKE'S PATENT DIRECT-ACTING STEAM-PUMPS.



IMPROVED DOUBLE-ACTION PUMPS.

For Water. For Tar. For Ammoniacal Liquor.

This illustration shows an arrangement of three (No. 179) Improved Double-Action Pumps driven from the same crank-shaft, as frequently supplied for use in Gas and Chemical Works. The suction and discharge pipes can be arranged for drawing from and delivering in any required direction

These Pumps have been supplied to nearly all the large Gas Companies and Chemical Works, both for Pumping Water, Tar, and Ammoniacal Liquor.

GAS SYPHON PUMPS, IN COPPER OR SHEET IRON, ALWAYS IN STOCK.

Illustrated Catalogues sent post free on application.

WANTED, by Samuel Thompson & Co., Colliery Office, Lancaster, APPLICATION for PRICES from Gas Managers who are prepared to receive Tenders for GAS COAL or CANNEL.

John Leigh, Esq., M.R.C.S., F.C.S., &c., &c., in his analytical report of S. T. & Co.'s Coal, says: "It is remarkable for its purity, I have scarcely ever examined a Coal containing so small a quantity of ash, and when Cannel of the best description is scarce, it may well replace this material."

T. NEWBIGGING,

CONSULTING GAS ENGINEER,

5, NORFOLK STREET, MANCHESTER.

HENRY LYON,

MECHANICAL AND CONSULTING GAS ENGINEER,

NORWOOD, NORTHENDEN ROAD,

SALE, NEAR MANCHESTER.

SANDELL AND SON,

PUBLIC ACCOUNTANTS,

2, GREAT GEORGE STREET, WESTMINSTER.

SANDELL AND SON having been engaged during the past 25 years in Gas Companies Accounts, either in Preparing or Investigating Statements for Parliamentary Applications, Arbitrations, and otherwise, offer with confidence their Services for similar purposes.

Mr. ROBERT DEMPSTER,

CONSULTING GAS ENGINEER,

ELLAND, near HALIFAX,

May be consulted on all matters connected with Valuations, Arbitrations, and Parliamentary Applications connected with Gas-Works. Having been engaged on extensive Arbitration Cases, which, combined with his experience in Construction and Contracting, his knowledge of Engineering and Valuations is both extensive and reliable.

ALFRED LASS, F.I.Accts.,

SPECIAL ACCOUNTANT FOR GAS AND WATER UNDERTAKINGS,

30, GRACECHURCH STREET, LONDON.

Accounts Analyzed and Statistics Prepared for Parliamentary Proceedings, Arbitrations, &c.

The Forms of Account, which have been specially designed by Mr. Lass to meet the requirements of the Gas-Works Clauses Amendment Act, 1871, are now in use by many Gas Companies, Corporations, and Local Boards.

HARPER & MOORES,

PROPRIETORS OF THE

BEST STOURBRIDGE CLAYS,

STOURBRIDGE.

Manufacturers of all Descriptions of

BEST STOURBRIDGE FIRE-BRICKS, LUMPS, AND CLAY RETORTS

Of all Dimensions for Gas-Works,

GLASS-HOUSE POTS & CRUCIBLES

ESTABLISHED 1836.

The Highest Award was obtained by H. & M., at the Philadelphia Exhibition, 1876, for Superior Quality of Manufacture. SILVER MEDAL, PARIS, 1878.

JAMES OAKES & CO.,

ALFRETON IRON-WORKS, DERBYSHIRE,

AND

WENLOCK IRON WHARF, 21 & 22, WHARF ROAD, CITY ROAD, LONDON, N.,

Manufacture and keep in stock at their works (also a large stock in London) PIPES and CONNECTIONS 1½ to 48 inches in diameter; and make to order Retorts, Purifiers, and Tanks, with or without planed joints, Columns, Girders, Special Castings, required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

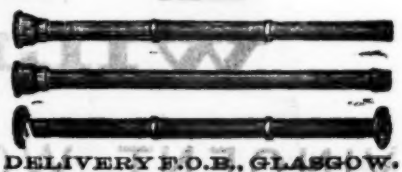
NOTE.—Syphons and Covers are joint-faced if required, doing away with millboard and iron boring, or Syphons made without Covers, a socket being cast on and fitted with a small plug about 6 inches in diameter with lead joint. In either way preventing leakage.

GAS AND WATER PIPES.

WILLIAM MACLEOD & CO.,

30, ST. ENOCH SQUARE, GLASGOW.

CAST-IRON GAS AND WATER PIPES.



DELIVERY F.O.B., GLASGOW.

Prices on application.

C. & W. WALKER,
8, Finsbury Circus,
London, E.C.

MANN & WALKERS' PATENT SCRUBBER.

By Letters Patent in Great Britain, Europe, and the United States of America.

By some important improvements recently patented, the purifying power of these Scrubbers has been much increased, and a stronger ammoniacal solution obtained, which is found to absorb a large portion of the carbonic acid contained in gas, effecting an important saving in money and labour in the lime purifiers, and where oxide only is used, the increase in the illuminating power of the gas obtained by these Scrubbers is shown in a remarkable degree, in consequence of the large quantity of carbonic acid removed from the gas.

It is to be particularly noted that the im- portant results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

Fifty million cubic feet of gas per 24 hours are purified from ammonia by these Patent Scrubbers in a winter's day in the gas-works of London, where the purity of gas supply is the highest in the world, under the chemical restrictions of the Board of Trade.

Generally, wherever a high standard of purification is maintained in the chief cities and towns of the British Provinces and of Europe, these Scrubbers have become established.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals, generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

They contain their own engine power, requiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

Applications relating to dimensions and prices should be addressed to us, C. and W. Walker, 8, Finsbury Circus, London, E.C., or to Mr. William Mann, late Superintendent of the Chartered Gas-Works, Blackfriars, London; they should state approximately the largest make of gas in 24 hours on a winter's day, and the smallest make on a summer's day, to be purified.

THE

SILBER LIGHT COMPANY,

MANUFACTURERS OF

SILBER'S PATENT TUBULATED BURNERS

FOR

COAL OR AIR GAS,

And of SILBER'S BAT'S-WING GAS-BURNERS and every variety of Gas-Fittings.

ALSO MANUFACTURERS OF

EVERY DESCRIPTION OF LAMPS (burning Colza Oil, Petroleum, Paraffin, or Kerosene) FOR DOMESTIC PURPOSES, STREETS, RAILWAY STATIONS, SHIPS, &c., &c.

FIG. 1.
Silber's Patent Tubulated Gas-Burner, drawn full size.

FIG. 2.
Section of Silber's Tubulated Gas-Burner, the arrows indicating the currents of air to the flame —two externally and two internally.
Dr. Wallace, F.R.S.E., Gas Analyst of Glasgow, says of this burner: "It gives the steadiest flame of any Argand yet constructed."

FIG. 3.
Silber's Tubulated Gas-Burner with glass bulb or vase beneath, and with larger inlet than aggregate outlet area, by which means the illuminating power for 5 cubic feet of 16-candle-light gas is increased one candle.

The Silber Tubulated Gas-Burner offers the following advantages over existing Argand Gas-Burners:—

1. It affords more light for 5 cubic feet of gas.
2. It is made of brass, and so put together that there is no liability of its melting, or coming to pieces in any other way, as burners made of soft metal are apt to do.
3. It is capable of burning from 4 to 7 cubic feet of gas per hour (by using chimneys of different lengths), and although the consumption be increased, **the illuminating power per cubic foot of gas remains almost quite constant.**
4. With the glass bulb or vase, as shown in fig. 3, the illuminating power for 5 cubic feet of 16-candle-light gas is **increased one candle.**

FIG. 4.
Silber's Bat's-Wing Gas-Burner.
The results obtained from this Burner are amongst the best obtained from any flat-flame Burners yet introduced.

FULL PARTICULARS & ENGRAVINGS

Forwarded on application to

THE SILBER LIGHT COMPANY,

49, WHITECROSS STREET,

LONDON, E.C.

FIG. 5.
Silber's Bat's-Wing Burner, with Opal Gas Moon.

ROBERT MARSHALL,

CANNEL COAL MERCHANT,

198, ST. VINCENT STREET, GLASGOW.

SHOTT'S BOGHEAD.

HARTHILL CANNEL

Yields 14,920 cubic feet of 40·92-candle gas per ton.

THRASHBUSH CANNEL

12,530 cubic feet of 40·22-candle gas per ton, and 9 cwts. of good coke.

LOTHIAN'S CANNEL

Yields 12,500 cubic feet of 34-candle gas per ton, and 9 cwts. of excellent coke, containing only 4 per cent. of ash.

MUIRKIRK, No. 1, CANNEL

Yields 12,160 cubic feet of 32·5-candle gas per ton, and 10 cwts. of excellent coke, containing only 5 per cent. of ash. This cannel is almost free from sulphur.

OLD WEMYSS CANNEL

Yields 13,320 cubic feet of 32·5-candle gas per ton.

Prices and full analyses on application at above address, or from WEDDERSPOON, FERGUSSON AND Co., 21, Lime Street, LONDON, E.C.

HEBBURN MAIN GAS COAL.

This Coal is now highly approved of for gas making, and yields over 10,000 feet per ton of 15-candle gas, and about 14 cwt. coke.

For references and prices, either f. o. b. or by rail, apply to

W. RICHARDSON,

29, QUAYSIDE, NEWCASTLE-ON-TYNE.

GAS COAL.

POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over* 10,000 *cubic feet of gas, with an illuminating power of* 16 *candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars, apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

THE

SILICA FIRE-BRICK CO.,

OUGHTIBRIDGE

Near SHEFFIELD,

Manufacturers of THE ORIGINAL SILICA OR DINAS FIRE-BRICKS. Specially adapted for Gas-Retort Furnaces and for Siemens's Gas-Furnaces. Shipments promptly executed to London, Liverpool, Hull, Grimsby, &c.

BIRTLEY IRON WORKS,

CHESTER-LE-STREET,

DURHAM.

Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.

Warehouse in London for Cast-Iron Pipes and Connexions of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.

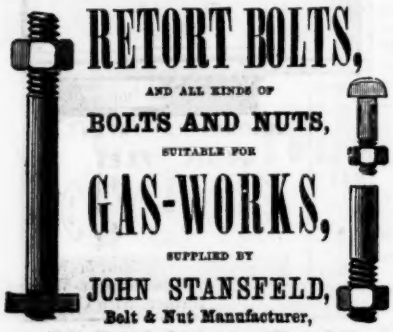
Agent in London, Mr. J. MANWARING, 161 Cannon Street, E.C.

M. BREMOND'S NAPHTHALINE PROCESS.

All negotiations respecting M. Brémond's patented process for preventing Deposits of

NAPHTHALINE

in Gas Main and Service Pipes should be addressed to Mr. W. H. BENNETT, 22, Great George Street, WESTMINSTER, S.W., or to M. BREMOND, Gas Engineer, Compania Madrilena de Alumbrado y Calefaccion por Gas, MADRID, who may be consulted upon all matters connected with the Gas Industry.



RETORT BOLTS,

AND ALL KINDS OF

BOLTS AND NUTS,

SUITABLE FOR

GAS-WORKS,

SUPPLIED BY

JOHN STANSFELD,

Bolt & Nut Manufacturer,

ALFRED ST., BOAR LANE, LEEDS.

FERRAND DAVIES,

148, GRESHAM HOUSE, OLD BROAD STREET, LONDON, E.C.,

AGENT FOR

THOMAS BARR'S LESMAHAGOW MAIN CANNEL,

AND

NEWTON, CHAMBERS, & CO.'S SILKSTONE GAS COALS.

Analyses and Quotations on application.

WILSON CARTER AND PEARSON,

GAS COAL AND CANNEL FACTORS,

Supply to any Railway Station or for Export all kinds of Fuel for Gas purposes.

Address—CHIEF OFFICES:

TEMPLE BUILDINGS, 50, NEW STREET, BIRMINGHAM.

GEORGE ANDERSON,

GAS AND CONSULTING ENGINEER,

35A, GREAT GEORGE STREET,

WESTMINSTER, S.W.,

PATENTEE and MANUFACTURER of the following Inventions:—

RETORT SETTINGS—giving great Economy of Fuel.

STEAM-ENGINES and EXHAUSTERS, FOUR-WAY VALVES, WASHERS, SCRUBBERS.

FUEL-MACHINE, for Compressing Breeze and Tar.

N.B.—Pamphlet, with Eighteen Illustrations and Letterpress on the Construction of Gas-Works, post free, 2s. 6d.

PRICES AND ALL PARTICULARS TO BE HAD OF THE PATENTEE,

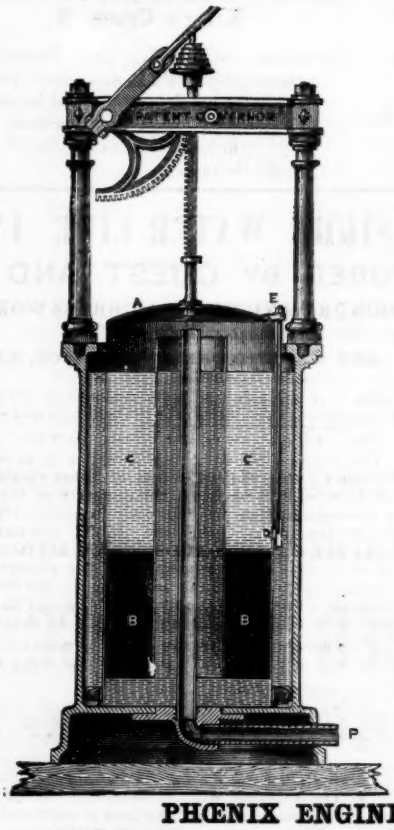
35a, GREAT GEORGE STREET, WESTMINSTER, S.W.

GEORGE WALLER & CO.,

GAS AND HYDRAULIC ENGINEERS,

Patent Compensating Steam Governor,

WITH SELF-CONTAINED WATER-BALANCE.



This is the most efficient and perfect Governor yet made to control and regulate the speed of Engines and Exhausters according to the varying make of gas, and maintain a steady gauge, whether working level or with six inches of seal.

It is the only Governor that will effectually control Condensing and Compound Engines, especially when the Exhauster is on light work, and the Engine is large.

During the drawing and charging of Retorts, the Engine requires no attention—a matter of great importance in small works.

Descriptive Circular sent on application.

They are in use at

BECKTON,
HAMPTON WICK,
DUKINFIELD,
HARTLEPOOL,
RAMSGATE,
SUTTON,

and about 30 other works.

G. W. and Co. make **special Steam Throttle Valves,** suitable for working with this Governor, and alter existing Throttle Valves to same plan.

See also advertisement, page 177.

PHŒNIX ENGINEERING WORKS,

Holland Street and Bear Gardens, Southwark, S.E.

THE WIGAN COAL & IRON COMPANY,

LIMITED,

DISTRICT OFFICE: 97, NEW STREET, BIRMINGHAM; AGENT: W. M'GOWAN,

Supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, &c.

N.B.—The Wigan Coal and Iron Company, Limited, are exclusive owners of the well-known HAIGH HALL AND KIRKLESS HALL GAS COAL COLLIERIES.

GAS COAL. GAS COAL. GAS COAL.

WELLS, BIRCH, RYDE, and CO., Limited,

HOYLAND SILKSTONE COLLIERIES,

Near BARNSLEY.

This Company is now in a position to raise **2000 tons per day of REAL OLD SILKSTONE GAS COAL.**

"The quality of this Coal for Gas purposes, if equalled, is not excelled by any on record, and the Coke competes successfully with best Durham."—See *Mining Journal*, Aug. 11, 1877.

Prices quoted to any Railway Station, or F.O.B. Hull, Grimsby, Goole, Keadby, Liverpool, and Fleetwood.

Full particulars will be sent on application to above address.

NO MORE WASTE LIME! SAVE THE VALUABLE PRODUCT!

G. R. HISLOP'S PATENT REGENERATIVE PROCESS

Most Effectively and Economically restores this waste *ad infinitum*.

The Patentee having devoted more time and attention to this subject than perhaps any other person living, is now in a position to recommend the adoption of this process to Gas Companies and Corporations with the utmost confidence in its practical utility, convenience, and economy. 1st. It restores the spent Lime at from one-third to one-half its original cost, apart from its undoubted convenience and the economy of space. 2nd. There is practically no limit to the duration of the Lime. 3rd. The cost of apparatus for the introduction of the process is very moderate and exceedingly durable. 4. The Patentee supplies special bricks and castings, erects and proves the process on the most favourable terms.

The process, in operation, may be seen at the Corporation Gas-Works, Paisley, where the Lime has been restored 120 times. Inspection is cordially invited.

For Terms, apply to GEO. R. HISLOP, F.C.S., Engineer, Gas-Works, PAISLEY, N.B.

PARIS EXHIBITION, 1878.

THREE MEDALS

AND

HONOURABLE MENTION

HAVE BEEN AWARDED TO

JOSEPH CLIFF & SONS

For their Various Exhibits, amongst which is a

SILVER MEDAL

FOR THEIR

PATENT MACHINE-MADE

RETORTS AND FIRE-BRICKS,

Being the Highest Honour given for this class.

Established

1795.

JOSEPH CLIFF & SONS,

THE ORIGINAL

WORTLEY FIRE-BRICK WORKS,

NEAR LEEDS,

London Wharf: No. 4, inside Great Northern Goods Station, King's Cross, N. Liverpool: Leeds Street.

SPECIAL NOTICE.—Our Patent Machine-Made Retorts have now been thoroughly tested, and have proved themselves infinitely superior to those made by hand. At several large works it has been settled, beyond question, that, owing to the compactness and general excellence, more gas is sent to the gasholder from each ton of coal carbonized than is the case with hand-made Retorts.

GOLDSMITH'S PATENT SIGHT WATER-LINE INDICATING GAS-METER.

MANUFACTURED BY GUEST AND CHRIMES,

FOUNDRY AND GENERAL BRASS WORKS, ROTHERHAM;

AND 85, SOUTHWARK ST., LONDON, S.E.

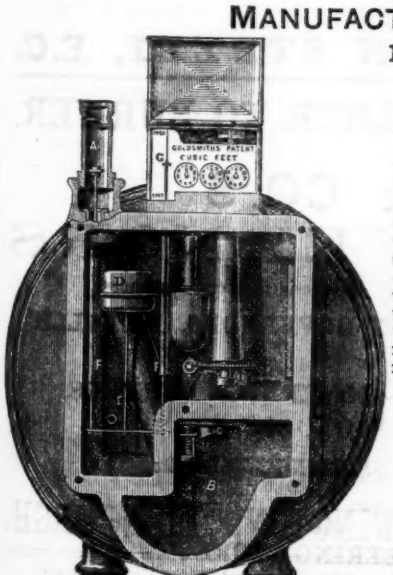


FIG. 1.—Three-light Meter, One-sixth Size.

Fig. 1 is a Meter with front removed to show the arrangement and connection of the Indicator and Valve.

Fig. 2 is front view of Index, with cover up.

The principal object of this invention is to render the water-line in the reservoir at all times visible. It will be seen, by reference to the illustrations, that this is accomplished in the following manner:—On the dial are the words "Open" and "Shut," and attached to the float is the pointer G, which rises and falls with the water-line in the reservoir. If the pointer is at "Open," it shows that the valve is open, and that the reservoir is full. If it is at "Shut," it shows that the reservoir is empty, and that the gas will be shut off.

The following ADVANTAGES will be obvious:—

1. The Inspector can see at a glance if the Meter requires water.
2. No more water than is required need be added, and therefore no water has to run out.
3. The Meter Inspector will be spared a great deal of his most objectionable work, and he will save a great deal of time and trouble.
4. The consumer will not always have to be asked for water, nor will he have to endure the unpleasant smell caused by waste water being run out.

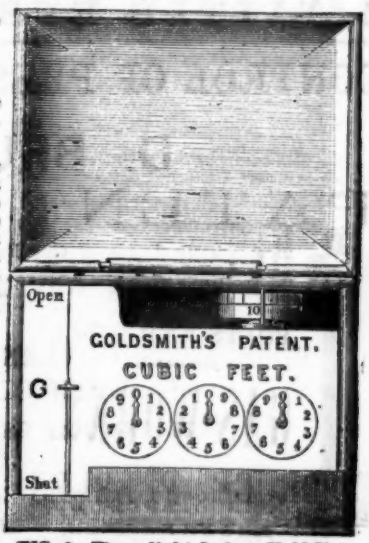


FIG. 2.—Three-light Index, Half Size.

CROLL'S
DRY GAS-METERS,

PRIZE MEDALS. (INVENTED & PATENTED IN 1844,) PRIZE MEDALS.

LONDON, 1851; NEW YORK, 1853; PARIS, 1855. COMBINING ALL THE LATEST IMPROVEMENTS, LONDON 1862; DUBLIN, 1865 PARIS, 1867.

MANUFACTURED ONLY BY

THE GAS-METER COMPANY, LIMITED,

238, KINGSLAND ROAD. LONDON, N.E.

ALEXANDER WRIGHT & CO.,

55, 55a, & 56, MILLBANK STREET, LONDON, S.W.,

MANUFACTURERS OF

WET AND DRY GAS-METERS,

GOVERNORS, GAUGES OF ALL KINDS, GAS-METER TESTING APPARATUS, AND INSTRUMENTS FOR THE ANALYSIS OF COAL GAS.

STANDARD LETHEBY PHOTOMETERS,

METERS, GOVERNORS, &c.,

As approved by the GAS REFEREES, AND USED BY THEM at their Offices, and every kind of Instrument necessary in the determination of the

ILLUMINATING POWER AND PURITY OF COAL GAS.

PHOTOMETERS suitable for use in Ordinary Rooms or Offices, and for Special Purposes, to Order.

LISTS ON APPLICATION.

R. LAIDLAW AND SON,

EDINBURGH AND **GLASGOW.**

Manufacturers of

CONSUMERS IMPROVED WET GAS-METERS,

THE UNVARYING WATER-LINE GAS-METERS,

IMPROVED DRY GAS-METERS, in Cast-Iron or Tin-Plate Cases;

STATION-METERS, ALL SIZES, up to 15 feet Square, with PLANED JOINTS;

Experimental Meters, Photometers, Pressure-Gauges, Governors, Test Holders, &c., &c.

LONDON OFFICE:

6, LITTLE BUSH LANE, CANNON STREET, E.C.

CONTROL OF PRESSURE FROM GASHOLDER TO BURNER.

D. BRUCE PEEBLES & CO.'S
PATENT GAS GOVERNORS

Place in the hands of Gas Engineers the means of controlling Pressure in all situations and circumstances.

SAFETY STATION GOVERNORS, METALLIC DRY DISTRICT GOVERNORS, METALLIC NEEDLE LAMP GOVERNORS.

CONSUMERS GOVERNORS AND DOMESTIC NEEDLE-GOVERNOR BURNERS, WITH GLOBE HOLDERS AND CORNELIAN GLOBES.

WET AND DRY GAS-METERS OF SUPERIOR EXCELLENCY, STATION-METERS, &c.

D. BRUCE PEEBLES & CO., TAY WORKS, BONNINGTON, EDINBURGH.

London: Printed by WALTER KING, for the Executors of the late WILLIAM BOUGHTON KING (at the office of Clayton and Co., 17, Bouverie Street, Fleet Street), and published by him at No. 11, Bolt Court, Fleet Street in the City of London.—Tuesday, February 3, 1880.